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(54) OPERATING DEVICE FOR GAME MACHINE, GAME MACHINE BODY, METHOD OF CONTROLLING OPERATING DEVICE FOR GAME MACHINE AND RECORDING MEDIUM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an operating device for game machine which causes a presence by providing an operating device side for the game machine having a plurality of operation buttons used for a video game machine with a response means to be actuated by a feedback from a game machine body.
SOLUTION: The operating device for game machine which progresses a game by two-way communication means of sending the operation data by the operation of the plurality of operation buttons to the game machine body and properly receiving data from the game machine body is provided with the response means to be actuated by specific response signals from the game machine body. The operating device is provided with an identification code region for assigning the response means and plural control data regions for the response means assigned by these identification codes as dynamic transmission data to be sent to the operating device for the game machine from the game machine body, thereby, the sending of various kinds of the control data to the single or plurality of response means is made possible.

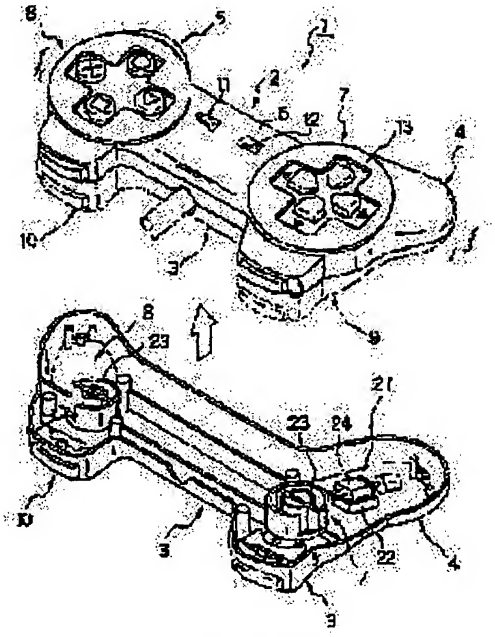

図1 第1の実施の形態

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CLAIMS

[Claim(s)]
[Claim 1] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. It is 1st response means to by_which have a response means answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and operate while being prepared in the position of the aforementioned operating set for game machines itself, and the aforementioned response means answers to the aforementioned specific data, operate so that the response by dynamic transfer may carry out, and, as for the aforementioned response means, the aforementioned dynamic transfer is performed. 2nd response means by which the aforementioned dynamic transfer is made by generating vibration with it. [there is little power consumption and weaker than the 1st response means]
[Claim 2] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. While being prepared in the position of the aforementioned operating set for game machines itself, it has a response means to answer the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and to operate. It is 1st response means by which the aforementioned response means answers the aforementioned specific data, operate so that the response by dynamic transfer may be performed, and the aforementioned dynamic transfer is performed by vibrator going and coming back to the aforementioned response means to a rectilinear, and generating vibration. 2nd response means by which the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached.
[Claim 3] The operating set for game machines equipped with the bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data which a game machine consists of connecting with the main part of a game machine which is characterized by providing the following, and which has the regenerative function of a video record medium, and are inputted from two or more operation buttons and aforementioned operation buttons to the aforementioned main part of a game machine. It is the 1st response means which it has a response means answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and operate while being prepared in the position of the aforementioned operating set for game machines itself, and the aforementioned response means answers the aforementioned specific data, it operates so that the response by dynamic transfer may be performed, and is a voice coil motor in the aforementioned response means. 2nd response means by which the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached.
[Claim 4] The operating set for game machines of the claim 1, 2, or 3 publications which are characterized by being prepared in one part other than a part characterized by providing the following. The aforementioned operating set for game machines has the 1st operation supporter for gripping and supporting in the palm, and the 2nd operation supporter, and the aforementioned response means is the operation supporter of the above 1st. The 2nd operation supporter. The center of the side which counters [that each aforementioned operation supporter of the aforementioned

operating set for game machines was formed, and]. It is prepared in the part of ******** and, for the response means of the above 1st, the response means of the above 2nd is a response means of the above 1st among the aforementioned parts to at least one part in the aforementioned part.

[Claim 5] It is the operating set for game machines according to claim 4 characterized by preparing the response means of the above 1st in the operation supporter of the above 1st, and preparing the response means of the above 2nd in the operation supporter of the above 2nd.

[Claim 6] The response means of the above 1st is an operating set for game machines according to claim 1 characterized by arranging one at each shaft orientations of each, respectively.

[Claim 7] the center of the side which counters [that is characterized by providing the following, and], and ** -- the operating set for game machines characterized by being prepared in any two places The operation button of plurality that a game machine consists of [and] connecting with the main part of a game machine which has the regenerative function of a video record medium. Bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data inputted from the aforementioned operation button to the aforementioned main part of a game machine. In the operating set for ******** game machines, while being prepared in the position of the aforementioned operating set for game machines itself It has a response means to answer the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications from the aforementioned main part of a game machine, and to operate. the aforementioned response means The aforementioned specific data are answered, the aforementioned dynamic transfer is made by vibration by rotation of the rotation section which was made to carry out eccentricity to the axis of rotation of a motor, and was attached while operating so that the response by dynamic transfer might be performed, and the aforementioned response means is the operation supporter of the above 1st. The 2nd operation supporter and each aforementioned operation supporter of the aforementioned operating set for game machines.

[Claim 8] The operating set for game machines according to claim 7 to which the oscillating direction of one response means is characterized by being arranged so that the oscillating direction of a X-Z flat surface and the response means of another side may serve as a Y-Z flat surface or a X-Y flat surface among the aforementioned response meanses.

[Claim 9] It is the main part of a game machine to which the operating set for game machines is connected. the aforementioned operating set for game machines The operation data based on operation of two or more operation buttons are sent out to the aforementioned main part of a game machine. And are what advances a game by the bidirectional means of communications which receives suitably the data from the aforementioned main part of a game machine, and the specific data of the aforementioned main part of a game machine are answered. It is the main part of a game machine characterized by the aforementioned main part of a game machine making the response means of the above 2nd generate vibration with it by having the 1st response means and the 2nd response means of performing the response by dynamic transfer. [there is little power consumption and weaker than the response means of the above 1st]

[Claim 10] It is the method which is characterized by providing the following and which is performed in the operating set for game machines. The 1st response means which answers the specific data inputted into the aforementioned operating set for game machines through the aforementioned means of communications at the aforementioned operating set for game machines at a position from the aforementioned main part of a game machine, and operates, and the 2nd response means which generates vibration with it are established. [there is little power consumption and weaker than this 1st response means] The control method of the operating set for game machines characterized by performing the response by the dynamic transfer which answered the aforementioned specific data with these response meanses. The operation button of plurality that a game machine consists of [and] connecting with the main part of a game machine which has the regenerative function of a video record medium. Bidirectional means of communications which receives the data inputted from the aforementioned main part of a game machine while sending out the operation data inputted from the aforementioned operation button to the aforementioned main part of a game machine.

[Claim 11] The record medium with which the computer program for operating the operating set connected to the computer as an operating set for game machines according to claim 1 to 8 was recorded and in which a computer readout is possible.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Table of Contents] this invention is explained in order of the following.
[0002] The technical field Prior art to which invention belongs (drawing 60)
The gestalt of gestalt (1) the 1st operation of implementation of technical-problem The-means-for-solving-a-technical-problem invention which invention tends to solve (drawing 1 - drawing 13)
(2) The gestalt of the 2nd operation (drawing 14 - drawing 35)
(3) The gestalt of the 3rd operation (drawing 36 - drawing 59)
(4) Gestalt effect-of-the-invention [0003] of other operations
[The technical field to which invention belongs] this invention relates to the operating set for game machines equipped with a means to answer so that presence may be brewed based on the specific signal from the main part of a game machine which has the function which reproduces especially a video record medium about the operating set for game machines which performs a game by operation of two or more operation buttons.
[0004]
[Description of the Prior Art] As the operating set CM for game machines in the conventional technology is shown in drawing 60 , it forms in a glasses configuration, and the housing main part consists of the upper cases 2 and the lower cases 3 which can be divided up and down. In the ends side of the longitudinal direction of this housing main part The 1st and 2nd operation supporters 4 and 5 projected to the corniform gripped and supported in the palm of both hands are formed. The start selection section 6 which consists of a switch used for ****** constriction ****** by a start, selection, etc. of a game in the position of the center of a housing main part, The 1st and 2nd control units 7 and 8 which consist of two or more switch groups which are formed in the right-and-left symmetric position of the both sides of a housing main part at a circle configuration, and are arranged in a part for the abbreviation center section, It consists of the 3rd and 4th control units 9 and 10 which consist of two or more switches which can be operated mainly by the index finger and the middle finger in the bilateral-symmetry position of the side by the side of the side-attachment-wall side of the anterior part of a housing main part.
[0005] The start selection section 6 is equipped with the start switch 11 and the selection switch 12 which are the so-called switch and have been arranged in the mid-position of the 1st control unit 7 and the 2nd control unit 8. The selection switch 12 chooses difficulty etc., when starting a game, and the start switch 11 is a switch which makes a game actually start.
[0006] The 1st control unit 7 has structure which formed the hollow section 13 equivalent to the crevice which made the shape of an abbreviation cross a part for the center section which carried out ****** and the circle configuration at the edge of a housing main part, and the window part 15 for four keytops 14a, 14b, 14c, and 14d projecting in the direction of outside from the interior in this hollow section 13. This window part 15 has the structure where it is arranged at 10 in all character writing directions at the abbreviation cross-like hollow section 13 as the head of four keytops 14a, 14b, 14c, and 14d faces each other.
[0007] As shown in drawing 60 , the 2nd control unit 8 forms the hollow section 16 equivalent to the crevice which made the shape of an abbreviation cross a part for the center section of a circle configuration, and has the structure of having four cylinder parts 17 which have opening of the size which carried out the cross, and which becomes depressed and can project the cylindrical shape-like keytops 16a, 16b, 16c, and 16d in the direction of outside from the interior in each position of the four directions of the section 16, respectively.
[0008] The sign (mark) which expresses functions, such as the recognition sign which is easy to check by looking, for example, O, **, **, and x, to the top face of each four keytops 16a, 16b, 16c, and 16d is attached, and the function of a switch can be easily discriminated now. Moreover, it has structure which prepared a characteristic salient and a

characteristic notch in the lower part side of the these keytops [16a 16b, 16c, and 16d] soffit section and a cylinder part 17 so that it might not go into other cylinder parts 17 at the time of an assembly.
[0009] The opening 18 which the wall surface by the side of the anterior part of the 1st and 2nd control units 7 and 8 is made to project, forms, and consists of a long and slender hole of two trains up and down in parallel with this projected wall surface as the 3rd and 4th control units 9 and 10 are shown in drawing 60 , this opening 18 -- ******** -- it consists of movement directive operation switches which projected and formed from the inside the keytops 19a, 19b, 19c, and 19d which carried out the long and slender configuration in the direction of an outside
[0010] It connects with the main part of a video machine which reproduces CD-ROM which is the video record medium which is not illustrated through a predetermined connector, and the operating set CM for game machines which has such composition is connected to monitors, such as a main part of a video machine, and a television receiver. And it usually has an operating set in the palm of both hands, the operation button group of the 1st - the 4th control unit 7, 8, 9, and 10 is operated with the finger of both hands, it points to the movement of targets of operation, such as a character on monitor display, and a game is performed.
[0011]
[Problem(s) to be Solved by the Invention] However, also in the conventional technology which gave [above-mentioned] explanation, it sets to the operating set CM for home video game machines. By operating the button group of the 1st - the 4th control unit with a finger, point to operation of the target of operation on monitor display, and a game is performed. The operating set itself which looks at the character on monitor display, namely, can feel to a visual sense and the sound generated from a monitor, i.e., an acoustic sense, but moves both hands and an arm variously and operates them Since only the function to operate it with a finger substantially and to direct ** on the other hand is utilized, it does not have a somesthesis function by feedback.
[0012] Therefore, it has the technical problem which must be solved to raise presence as the somesthesis which feeded back from the main part of a game machine is obtained by the operating set itself, and raise a game performance to operation of a button group when specific operation and a scene are therefore encountered.
[0013]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the operating set for game machines concerning this invention established suitably a response means of ****** and the aforementioned operating set drive by the specific reply signal of the aforementioned main part of a game machine in a position, by the operating set which advances a game by the bidirectional means of communications which is connected to the main part of a game machine which has the regenerative function of a video record medium, and sends out the operation data based on operation of two or more operation buttons to the aforementioned main part of a game machine, and receives suitably the data from the aforementioned main part of
[0014] Moreover, it is forming by the vibration by rotation of the rotation section which this response means' was formed in a kind of dynamic transfer, sound, and light, or two sorts or more of combination, was made to carry out eccentricity of the dynamic transfer to the axis of rotation of a motor, and was attached, or vibration of the vibrator therefore driven in a coil.
[0015] Furthermore, various control data can be transmitted to the singular number or two or more response meanses by having two or more identification code fields which specify a response means, and control data fields to the response means therefore specified to be the identification code concerned as dynamic transfer data transmitted to the operating set for game machines from the main part of a game machine.
[0016] By having made it the above-mentioned composition, in addition to the somesthesis by the acoustic sense and the visual sense, the operating set for game machines concerning this invention can obtain the somesthesis in the dynamic transfer by vibration of the operating set itself etc., when the time of carrying out specific operation and a target of operation hit.
[0017]
[Embodiments of the Invention] The gestalt of various operations of the operating set for game machines concerning this invention is explained with reference to a drawing. In addition, since the operating set for game machines concerning this invention is the same as that of the configuration where it explained with the conventional technology, the same sign is given to the same member and the explanation is given so that it may be easy to understand.
[0018] (1) The operating set 1 for game machines of the gestalt of the 1st operation concerning the gestalt this invention of the 1st operation The housing main part equipped with the 1st and 2nd operation supporters 4 and 5 projected to the corniform gripped and supported in the palm of both hands to the ends side of the longitudinal direction formed in the glasses configuration as shown in drawing 1 , The start selection section 6 which the button used for a start, selection, etc. of a game was made to project in the direction of outside to ****** constriction ******, and formed it in it from the interior in the position of the center of a housing main part, The 1st which made the

crowning of the both sides of the longitudinal direction of a housing main part project a button in the direction of outside from the interior, and 2nd control units 7 and 8, The 3rd and 4th control units 9 and 10 which equipped the wall surface by the side of the front of the longitudinal direction both sides of a housing main part with the button made to project in the direction of outside from the interior, The substrate which contains the switch group with which the interior of the housing main part which is not illustrated is equipped, and CD-ROM which is the video record medium which is not illustrated, and manages communication with the reproducible main part of a game machine, It consists of a connector 20 (refer to drawing 4) equipped with the cable which connects the main part of a game machine electrically, and a response means 21 arranged to the predetermined space inside a housing main part. the inside of this, and drawing 38 -- using -- explanation -- the bottom, the difference with the conventional technology is the point of having established the proper response means 21, and others have the same structure and same composition as the conventional technology

[0019] That is, the housing main part which consisted of an upper case 2 and a lower case 3 has structure which formed the response means arrangement section 22 for equipping with the response means 21 the 1st operation supporter 4 which is the part projected to the corniform in the lower case 3.

[0020] The 1st of the lower case 3 and the 2nd control unit 7 and 8 have structure which prepared the rectangle-like 3rd and the 4th control unit 9 and 10 which formed the installation section 23 of the shape of a cylindrical shape for setting a substrate and a switch group, and were made to project to the front-face side of the 1st and 2nd control units 7 and 8, as shown in drawing 1 .

[0021] In the lower case 3 which consists of such structure, as space which can set the response means 21, as shown in drawing 1 and drawing 4 , the space which exists in the part of the 1st gripped and supported in the palm and 2nd operation supporters 4 and 5 or the narrow anterior position of the start selection section 6 can be used. It has structure which carried out receipt arrangement at the 1st operation supporter 4 gripped in the left palm in the gestalt of this operation.

[0022] Here, the response means 21 has structure which attached the cylindrical shape-like rotation section 26 in the position which shifted namely, carried out eccentricity of the center position to the axis of rotation 25 of a motor 24 and this motor 24, as shown in drawing 2 . In such structure, when a motor 24 carries out a rotation drive, the rotation section 26 is the structure which carries out eccentric rotation and which vibration generates, and this vibration is a kind of dynamic transfer. This vibration is transmitted to the case of the 1st operation supporter 4 lower case 3 and upper case 2 in drawing 1 and drawing 3 , and the whole equipment is coming to vibrate. This condition of generated vibration which carries out eccentricity can be arbitrarily changed by the rotational speed and torque of a motor 24 of the response means 21, and, therefore, can change the strength of a response means to it.

[0023] As shown in drawing 1 , the response means arrangement section 22 prepared in the lower case 3 has structure prepared in the pars basilaris ossis occipitalis of the part which the palm of the 1st operation supporter 4 contacts, and has structure which can fix the motor 24 of the response means 21.

[0024] Thus, by having attached in the part which grips and supports the response means 21 with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 5 , in case the operating set 1 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] The rotation drive of the motor 24 of the response means 21 can be carried out by the specific reply signal of the main part 27 of a game machine, and fixed time vibration of the operating-set 1 whole for game machines can be carried out. Thus, it can feed back to the user who operating-set 1 the very thing for game machines causes vibration to operation by a user's operation button, and therefore uses for it as somesthesis, and presence can be raised further.

[0025] The CD-ROM driver which has the function which reproduces CD-ROM which is a video record medium here as the main part 27 of a game machine is shown in drawing 5 is built in. The covering device material 28 which contains CD-ROM in the upper surface of the main part 27 of a game machine, and covers it, It has the open/close switch 29 which opens and closes the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 1 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, the composition which connected one operating set 1 for game machines in the form of this operation explains.

[0026] As described above, in order to make the response means 21 drive and to vibrate the operating-set 1 whole for game machines, it is required between the operating set 1 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function.

[0027] This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 1 for game machines, and bidirectional serial communication, as shown in drawing 6 .
[0028] The composition which performs the two-way communication function by the side of the operating set 1 for game machines consists of the main part 27 of a game machine, a serial I/O-interface SIO which performs serial communication, an one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and a motor driver 34 which carries out the rotation drive of the motor 24 of the response means 21, and a motor 24 carries out a rotation drive by the supply voltage and the current from the motor driver 34.
[0029] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 1 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 1 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 1 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.
[0030] The signal line and the control line which perform bidirectional serial communication The signal line TXD (TransmitX' for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 1 for game machines, The signal line RXD (Received X' for Data) for data transmission which sends data to the main part 27 side of a game machine from the operating-set 1 side for game machines, The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, It consists of the control lines DSR (Data Set Ready) for the flow controls for performing the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 1 for game machines which are a terminal side (Data Terminal Ready), and a lot of data transfer.
[0031] Moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 6 , the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, it connects with the motor driver 34 by the side of the operating set 1 for game machines, and this cable 35 for power supplies supplies the power supply which rotates a motor 24.
[0032] In order that the main part 27 of a game machine shown in drawing 4 may communicate with the operating set 1 for game machines and the bidirectional serial communication procedure which consists of such composition may incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10, the main part 27 of a game machine outputs select data to the control line DTR first. Consequently, the operating set 1 for game machines will check that it has therefore been chosen as the control line DTR, and will be in the receiving waiting state of the signal line TXD following it. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 1 for game machines to the signal line TXD for data transmission. Thereby, the operating set 1 for game machines receives this identification code from a signal line TXD.
[0033] By showing the operating set 1 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 1 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the signal line RXD for data transmission from the operating set 1 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 1 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.
[0034] Thus, if it has bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 1 side for game machines, from the main part 27 side of a game machine, the data for dynamic transfer made to rotate the motor 24 of the response means 21 through the signal line TXD for data transmission can be sent out to the operating-set 1 side for game machines. Therefore, the data for dynamic transfer made to rotate this motor 24 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 1 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation. It explains to the flow chart of drawing 7 and drawing 8 at a below ****** detail, referring to drawing 1 and drawing 6 about this point.
[0035] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 1 for game machines shown in drawing 1 , and various functions are set

up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.
[0036] And as for the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 1 for game machines which were shown in ****** and drawing 6 , the data for dynamic transfer of a hit are monitoring continuously whether it has been sent through serial I/O-interface SIO from the main part 27 side of a game machine through serial interface SIO. Time to drive the control signal and motor 24 of the voltage which drives the motor 24 shown in drawing 6 , and current is contained in this data for dynamic transfer. And when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing, the motor driver 34 is made to drive and predetermined-time supply of the voltage currently supplied from the main part 27 of a game machine is carried out at a motor 24. That is, the data for dynamic transfer in the data signal received by the operating-set 1 side for game machines in the step ST 21 of drawing 7 are judged at a step ST 1, it processes with the microcomputer of a step ST 2, the motor driver 34 shown in drawing 6 at a step ST 3 is driven, and vibration is generated at a step ST 4.
[0037] Moreover, if an operation button is operated in a step ST 5 when it is not data for dynamic transfer at a step ST 1, the operation data operated in a step ST 6 will be inputted into a microcomputer through parallel I/O-interface PIO shown in drawing 6 .
[0038] The operation data inputted into the microcomputer are processed with a microcomputer in a step ST 2, are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO shown in drawing 6 . Then, the operating set 1 for game machines awaits the data from the main part 27 of a game machine in a step ST 25.
[0039] Reception of the operation data from which the main part 27 of a game machine was changed into serial data in the step ST 26 of drawing 8 distinguishes a line intermediary and a hit state for comparison with the data of a target of operation, and the serial data which received in the continuing step ST 8.
[0040] In a step ST 9, when the data and serial data of a target of operation are in agreement (i.e., when it hits) While displaying the target of operation hit in a step ST 10 on the screen of a monitor The data for dynamic transfer are outputted in a step ST 11, and the operating set 1 for game machines is answered as a specific reply signal through serial I/O-interface SIO which changes into serial data in a step ST 12, and is shown in drawing 6 . Then, the main part 27 of a game machine awaits the data from the operating set 1 for game machines in a step ST 27. If it is detected by the microcomputer of the operating set 1 for game machines as Steps ST1, ST2, and ST3 explained the dynamic transfer data answered from the main part 27 of a game machine by the operating set 1 for game machines, a motor 34 will be made to supply and rotate a power supply from the motor driver 34 shown in drawing 6 , and, therefore, the operating-set 1 whole for game machines will vibrate to the rotation.
[0041] When having not hit, in a step ST 13, the target of operation based on the operation button is displayed on the screen of a monitor, and, therefore, it comes to carry out the next operation to the operation result of the operation button from the operating set 1 for game machines by the step ST 5 (drawing 7).
[0042] Moreover, although the data for dynamic transfer generated when [at which explanation was given / above-mentioned] it hits have composition which the operating set 1 for game machines receives from the main part 27 of a game machine as a specific reply signal, the composition therefore sent out to Mukai's communication on the other hand from the main part 27 of a game machine at the operating set 1 for game machines is sufficient as them.
[0043] Next, the form of other operations of the operating set using the response means by the motor 24 concerning this invention is explained with reference to drawing 9 - drawing 11 .
[0044] As the operating set 1 for game machines of the form of this operation is shown in drawing 9 - drawing 11 , the part which grips the response means 21 in the palm has pinch-and-swell or deforming structure. The operating set 1 for game machines with the 1st operation supporter 4 gripped and supported in the left palm Namely, ******, It is made to close notching and its notching section for a part of part which a palm contacts. Elastic member 37A, 37B -- attaching -- these elastic members 37A and 37B -- from the interior -- relative -- or -- partial -- extruding -- making -- deformation -- or it carries out pinch-and-swell -- making -- it -- therefore -- a palm -- it has structure to which the somesthesis of the so-called response which gives dynamic transfer inside is made to feed back
[0045] in addition -- as elastic members 37A and 37B -- rubber -- a member or a resin -- a member or cloth -- a member etc. can be used
[0046] Except the attachment structure of the response means 21, since it is substantially the same, the same sign is given and explained to be the form of the 1st operation explaining aforementioned drawing 1 , and bidirectional serial communication is also performed by the same technique.
[0047] The response means 21 has structure which equipped with elastic members 37A and 37B as cut and plugged up notching and the lacked portion for a part of part which the palm of the 1st operation supporter 4 of the upper case 2

and the lower case 3 contacts. And as shown in the interior at drawing 10 , it consists of a motor 38 which carries out a rotation drive, and the rotation section 41 of the circle configuration which was attached in the axis of rotation 39 of a motor 38, and was equipped with the salient 40 of plurality [position] suitably of a periphery. Thus, the part which the palm of the 1st operation supporter 4 contacts has a lengthwise short size, and the attached elastic members 37A and 37B have the structure where a lateral size is long, as shown in drawing 11 . Therefore, if the rotation section 41 of a circle configuration rotates, the up position of elastic member 37A of the upper case 2 and the lower position of elastic member 37B of the lower case 3 are pressed, and as the salient 40 of the rotation section 41 extrudes in the direction of an outside, it will rotate in it. As shown in drawing 9 and drawing 11 , in the top and bottom position of a part where the palm of the 1st operation supporter 4 contacts, pinch-and-swell can be carried out, and deformation or the elastic members 37A and 37B by salient 40 can strike this outside, therefore it can make a phenomenon generate vibration, and can raise the presence therefore given to a user to the feel and feedback function by dynamic transfer in a palm.

[0048] Furthermore, the form of other operations of the operating set using the response means by the motor 24 concerning this invention is explained with reference to drawing 12 - drawing 13 .

[0049] As this operating set 1 for game machines is shown in drawing 12 and drawing 13 , the response means 21 prepared in the operating set 1 for game machines has deformation or structure which was made to carry out pinch-and-swell. That is, in the 1st operation supporter 4 gripped and supported in the left palm, the operating set 1 for game machines forms the part which a palm contacts by the elastic member 42, and has structure which formed the rotation section 45 of the cam configuration attached in the axis of rotation 44 of a motor 43 and a motor 43 in the interior.

[0050] The rotation section 45 which carried out the cam configuration can obtain presence by also generating vibration and receiving the dynamic transfer as somesthesis in the palm while the portion which the cam projected will strike an elastic member 42 from the inside, or will press it and it will project and deform it outside for it, if a motor 43 carries out a rotation drive.

[0051] (2) Drawing 14 which attaches and shows the same sign to a corresponding point with form drawing 1 of the 2nd operation shows the form of operation of the 2nd of the operating set for game machines by this invention, and the response means 51 is formed in the response means arrangement section 52 formed in the interior of the 1st operation supporter 4 of the lower case 3. This response means 51 has the vibrator 53 to which it goes and comes back to a rectilinear.

[0052] That is, as shown in drawing 15 , therefore, the response means 51 of the form of the 2nd operation forms a stator 54 in the two magnetic substance 55 and 56 which makes the both-way vibration of this vibrator 53 carry out in the direction of an axis of the coil bobbin 57 while forming vibrator 53 in the thing of the cylindrical shape-like coil bobbin 57 for which weight 63 is mostly fixed in the center therefore.

[0053] In the ends of a coil bobbin, an electric conduction line is wound around an opposite direction, respectively, and the 1st coil 58 and the 2nd coil 59 are formed. thus, loosely fitting in which the coil bobbin 57 with which coils 58 and 59 were formed in right-and-left ends was drilled by the magnetic substance 55 and 56 in the both ends, respectively -- it fits loosely into Holes 55E and 56E (drawing 15), and is held at the state where it may therefore move reciprocately in the hanging section 60 which consists of supporter material 61 and flat spring 62

[0054] Drawing 16 shows the cross section of the response means 51, the two magnetic substance 55 and 56 which forms a stator 54 makes a sheathing configuration the shape of a cylindrical shape mostly, respectively, and the ****** cylindrical shape-like magnetic pole sections (south pole) 55A and 56A protrude on the medial-axis line. Therefore, it connects with the magnetic substance 55 and 56 carrying out insertion fixation of the iron core 64 between [of these two] magnetic pole section 55A and 56A. the member which incidentally connects the magnetic substance 55 and 56 - - the resin of not only the iron core 64 but non-magnetic material -- a member is sufficient

[0055] Moreover, the magnetic pole sections (N pole) 55B and 56B which protruded in a circle are formed in the position which separated the predetermined gap on each circumferential side of the magnetic pole sections 55A and 56A, and countered it. Therefore, in the magnetic substance 55, flux density B exists in the gap between magnetic pole section 55A and magnetic pole section 55B (loosely fitting hole 55E), and flux density B exists in the gap between magnetic pole section 56A and magnetic pole section 56B (loosely fitting hole 56E) in the magnetic substance 56. loosely fitting of the magnetic substance 55 -- one edge of the coil bobbin 57 which forms vibrator 53 fits loosely into hole 55E, and it is arranged so that the coil 58 wound around this edge may cross magnetic flux moreover, the magnetic substance 56 -- also setting -- the same -- carrying out -- loosely fitting -- the other-end section of the coil bobbin 57 fits loosely into hole 56E, and it is arranged so that the coil 59 wound around this edge may cross magnetic flux

[0056] The state where it moved leftward the edge in which the coil 58 of vibrator 53 was formed here as shown in drawing 17 (A) contacts the magnetic substance 55 is made into an initial state. While adding drive current I58 as shown in drawing 18 (A) to a coil 58 If drive current I59 as shown in drawing 18 (B) to a coil 59 is added, in an initial

state (time t= 0), drive current I58 flows in a coil 58, and it will be in the state where drive current I59 does not flow in a coil 59.
[0057] Thereby, when force F=I58xB joins a coil 58, vibrator 53 moves rightward (namely, direction which faces to the magnetic substance 56), and the edge in which the coil 59 of vibrator 53 was formed as shown in drawing 17 (B) suspends it in the position which contacts the magnetic substance 56.
[0058] And at the time t=T and ****** time, as shown in drawing 18 (B), drive current I59 flows in a coil 59, and it will be in the state where drive current I58 does not flow in a coil 58, as [show / in drawing 18 (A)]. Therefore, when the winding direction of coils 58 and 59 is an opposite direction, the force -F Weak joins a coil 59. Consequently, vibrator 53 moves leftward (namely, direction which faces to the magnetic substance 55), and returns to the initial state shown in drawing 17 (A).
[0059] Vibrator 53 will move reciprocately namely, vibrate among the magnetic substance 55 and 56 by energizing hereafter the drive current I58 and I59 added to coils 58 and 59 by turns similarly.
[0060] Incidentally, if the period of drive current I58 and I59 is changed, the oscillation frequency of vibrator 53 can be changed, and if the current value of drive current I58 and I59 is changed, the force F (namely, acceleration) of joining vibrator 53 can be changed. In addition, if the magnetic substance 55 and 56 is enlarged, flux density B will become large, and the force F of joining vibrator 53 can be enlarged. In this case, by making the magnetic substance 55 and 56 into a stator 54, compared with the case where the magnetic substance 55 and 56 concerned is formed in a vibrator side, even if it enlarges the magnetic substance 55 and 56, the mass by the side of vibrator cannot change only by the mass by the side of a stator increasing, but vibration sufficient thereby practically can be generated.
[0061] If drive current I58 and I59 (let these be drive current I collectively hereafter) is added to coils 58 and 59 and vibrator 53 is vibrated in this way, this vibration will be transmitted to the 1st operation supporter 4 through the response means arrangement section 52 which fixed the stator 54 to the lower case 2 (drawing 14) (drawing 19). Vibration transmitted to the 1st operation supporter 4 is transmitted to the case of the 1st operation supporter 4 lower case 3 and upper case 2 concerned, and the whole equipment comes to vibrate. Therefore the condition of vibration therefore generated in this vibrator 53 can change at arbitration the drive current I added to the coils 58 and 59 of the response means 51, and, therefore, can change the strength of vibration of the response means 51 to it.
[0062] Incidentally, as space which can set the response means 51, as shown in drawing 14 and drawing 20 , the space which exists in the part of the 1st gripped and supported in the palm and 2nd operation supporters 4 and 5 or the anterior position of the start selection section 6 inserted into two control units 7 and 8 can be used. It has structure which carried out receipt arrangement at the 1st operation supporter 4 gripped in the left palm in the form of this operation.
[0063] Thus, by having attached in the part which grips and supports the response means 51 with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 21 , in case the operating set 50 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] The vibrator 53 of the response means 51 can be vibrated by the specific reply signal of the main part 27 of a game machine, and fixed time vibration of the operating-set 50 whole for game machines can be carried out. Thus, it can feed back to the user who operating-set 50 the very thing causes vibration to operation by a user's operation button, and therefore uses for it as somesthesis, and presence can be raised further.
[0064] The CD-ROM driver which has the function which reproduces CD-ROM which is a video record medium here as the main part 27 of a game machine is shown in drawing 21 is built in. The covering device material 28 which contains CD-ROM in the upper surface of the main part 27 of a game machine, and covers it, It has the open/close switch 29 which opens and closes the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 50 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, the composition which connected one operating set 50 for game machines in the form of this operation explains.
[0065] As described above, in order to make the response means 51 drive and to vibrate the operating-set 50 whole for game machines, it is required between the operating set 50 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function. This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 50 for game machines, and bidirectional serial communication, as shown in drawing 22 .
[0066] The composition which performs the two-way communication function by the side of the operating set 50 for

game machines consists of the main part 27 of a game machine, an I/O-interface SIO which performs serial communication, an one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and a coil driver 64 which vibrates the vibrator 53 of the response means 51, and the coils 58 and 59 of vibrator 53 vibrate by the supply voltage and current from the coil driver 64.

[0067] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 50 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 50 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 50 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.

[0068] The signal line and the control line which perform bidirectional serial communication signal line TXD (Transmit X'for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 50 for game machines signal line RDX for data transmission (Received X'for Data) which sends data to the main part 27 side of a game machine from the operating-set 50 side for game machines The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 50 for game machines which are a terminal side (Data Terminal Ready) It consists of the control lines DSR for the flow controls for performing a lot of data transfer (Data Set Ready).

[0069] Moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 21 , the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, it connects with the coil driver 64 by the side of the operating set 50 for game machines, and this cable 35 for power supplies supplies the power supply which vibrates vibrator 53.

[0070] First, it will check that the main part 27 of a game machine has therefore been chosen as the control line DTR, and the bidirectional serial communication procedure which consists of such composition will be in the receiving waiting state of the signal line TXD following it, in order for the main part 27 of a game machine shown in drawing 22 to communicate with the operating set 50 for game machines and to incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 50 for game machines to the signal line TXD for data transmission. Thereby, the operating set 50 for game machines receives this identification code from a signal line TXD. By showing the operating set 50 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 50 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the signal line RXD for data transmission from the operating set 50 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 50 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.

[0071] Thus, if it has bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 50 side for game machines, from the main part 27 side of a game machine, the data for dynamic transfer which vibrate the vibrator 53 of the response means 51 through the signal line TXD for data transmission can be sent out to the operating-set 50 side for game machines. Therefore, the data for dynamic transfer which vibrate this vibrator 53 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 50 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation. It explains to the flow chart of drawing 23 which attaches and shows the same sign to a corresponding point with drawing 7 and drawing 8 , and drawing 24 at a below ****** detail, referring to drawing 14 and drawing 22 about this point.

[0072] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 50 for game machines shown in drawing 14 , and various functions are set up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.

[0073] And the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 50 for game machines which were shown in ****** and drawing 22 is continuously monitored in the step ST 21 which shows

drawing 23 whether the data for dynamic transfer of a hit have been sent through serial I/O-interface SIO through serial interface SIO from the main part 27 side of a game machine. Time to drive the control signal and vibrator 53 of the voltage which drives the vibrator 53 shown in drawing 22 , and current is contained in this data for dynamic transfer. And when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing, the coil driver 64 is made to drive and predetermined-time supply of the voltage and current which are supplied from the main part 27 of a game machine is carried out at the coils 58 and 59 of vibrator 53.

[0074] That is, after judging the data for dynamic transfer in the data signal received by the operating-set 50 side for game machines at a step ST 1, microcomputer processing is carried out in a step ST 2. The data for dynamic transfer obtained as a result are changed into an analog signal in a step ST 22, and, therefore, the coil driver 64 (drawing 22) is driven to the analog signal concerned in the continuing step ST 23. By supplying drive current I to the coils 58 and 59 of vibrator 53 from the coil driver 64 in this way, vibrator 53 vibrates in a step ST 24.

[0075] Moreover, when the data signal supplied to the operating set 50 for game machines from the main part 27 of a game machine is not data for dynamic transfer, the microcomputer of the operating set 50 for game machines awaits the state where a ****** operation button is operated by the step ST 5 from the step ST 1 of drawing 23 . If an affirmation result is obtained here, this will mean that the operation button of the operating set 50 for game machines was operated, and a microcomputer will incorporate ****** and operation data through parallel I/O-interface PIO to a step ST 6 at this time.

[0076] The operation data inputted into the microcomputer are processed in the step ST 2 of drawing 23 , are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO (drawing 22). Then, the operating set 50 for game machines will be in the state of awaiting the data from the main part 27 of a game machine in a step ST 25.

[0077] The main part 27 of a game machine receives the data from the operating set 50 for game machines in the step ST 26 shown in drawing 24 , and distinguishes a hit state for comparison with the data of a target of operation, and the serial data which received in a line intermediary and a step ST 9 in the continuing step ST 8.

[0078] When the data of a target of operation and the serial data which received are in agreement here (i.e., when it hits) While displaying the target of operation which carried out the ****** hit on a step ST 10 on the screen of a monitor from a step ST 9 The data for dynamic transfer are outputted in a step ST 11, it changes into serial data in a step ST 12, and the operating set 50 for game machines is answered as a specific reply signal through serial I/O-interface SIO (drawing 22). If it is detected by the microcomputer of the operating set 50 for game machines as the step ST 1, the step ST 2, and Step ST 3 of drawing 23 explained this data for dynamic transfer, a power supply will be supplied to the coils 58 and 59 of vibrator 53 from the coil driver 64 (drawing 22), this will be vibrated, and, therefore, the operating-set 50 whole for game machines will vibrate to the vibration.

[0079] On the other hand, if a negative result is obtained in a step ST 9 (drawing 24) The data of a target of operation and the serial data of this from the operating set 50 for game machines do not correspond, namely, the thing which has not been hit -- expressing -- **** -- this time -- CPU (Central Processing Unit) of the main part 27 of a game machine After displaying the target of operation based on the ****** operation button on a step ST 13 on the screen of a monitor, the data from the operating set 50 for ****** game machines are awaited to a step ST 27.

[0080] Incidentally, although the data for dynamic transfer generated when [at which explanation was given / above-mentioned] it hits have composition which the operating set 50 for game machines receives from the main part 27 of a game machine as a specific reply signal, the composition therefore sent out to Mukai's communication on the other hand from the main part 27 of a game machine at the operating set 50 for game machines is sufficient as them.

[0081] Drawing 25 (A) shows the packet data PA for driving especially the coils 58 and 59 of vibrator 53 among the data for dynamic transfer transmitted to the operating set 50 for game machines from the main part 27 of a game machine, and, in the case of the gestalt of this operation, therefore, one packet is constituted by four current-value data here. As for each microcomputer of the main part 27 of a game machine, and the operating set 50 for game machines, data processing is performed by every 1 / 60 seconds (one frame), and the packet data PA are transmitted to the operating set 50 for game machines every [1/] 60 seconds from the main part 27 of a game machine according to this.

[0082] Therefore, four current-value data in 1 packet By distributing within a 1/4-frame period [every] one-frame period, the drive current value which adds only the number of the current-value data in a packet to the coils 58 and 59 of vibrator 53 in an one-frame period can be changed.

[0083] That is, therefore, data processing of the data for dynamic transfer transmitted to the operating set 50 for game machines from the main part 27 of a game machine in a certain one-frame period is carried out to the microcomputer of the operating set 50 for game machines concerned, and the packet data PA are read. In the case of drawing 25 (A), four current-value data "2", "3", "5", and "3" are read as packet data PA, and after these current-value data are changed into an analog signal, they are sent out to the coil driver 64 mentioned above about drawing 21 .

[0084] The coil driver 64 obtains the drive current signal SD therefore shown in therefore carrying out analog amplification at drawing 25 (B) to the power supply to which the current value changed into the analog signal is supplied from the main part 27 of a game machine. This drive current signal SD The current-value data of the packet data PA "2", In the 1st frame period floor line 1 (time t11-t15) which corresponds to "3", "5", and "3", and is supplied to coils 58 and 59 from the coil driver 64 It begins. In a 1/4-frame period (time t11-t12), it becomes the current value corresponding to the 1st current-value data "2." The start concerned A 1/4-frame period is followed. In a 1/4-frame period (time t12-t13), it becomes the current value corresponding to the 2nd current-value data "3." furthermore, this is followed the current value corresponding to the 3rd current-value data "5" at the 1/4-frame period (time t13-t14) -- becoming -- the last In a 1/4-frame period (time t14-t15), it becomes the current value corresponding to the 4th current-value data "3."

[0085] Thus, by ******'s also storing the current-value data of plurality (in the case of the form of this operation four) in the packet of the data for dynamic transfer concerned whole 1 / 60 seconds, and transmitting from the main part 27 of a game machine, the data transfer timing for dynamic transfer transmitted to the operating set 50 for game machines can distribute two or more current-value data concerned to an one-frame period in the operating set 50 for game machines, and can consider as the drive current signal SD.

[0086] Consequently, therefore, vibrator 53 is driven to the drive current signal SD which changes by the time interval finer than the time interval (one-frame period) to which the data for dynamic transfer are transmitted. Thus, while being able to set the frequency of vibrator 53 as the number of the current-value data assigned in a packet by changing the wave of the drive current signal SD arbitrarily by the fine time interval and various current-value data therefore, therefore, the acceleration of vibrator 53 can be set as current value.

[0087] Incidentally, various values are set up according to the degree of the shock with which the current-value data set as the packet data PA join the operation-on advance target of a game in the main part 27 of a game machine. In this case, the number of various [in addition to four] also in the number of the current-value data assigned in 1 packet is assigned. Therefore, in being the scene on which big impulse force joins for example, a target of operation by setting up various drive current wave types according to the advance situation of a game, when big current value joins [a short time] coils 58 and 59 by turns, a big vibration like a shock occurs in the operating set 50 for game machines. On the other hand, in being the scene which vibration which followed the target of operation small, for example like the idling of an automobile generates, when small current value joins coils 58 and 59 by turns for a long time, vibration just like the idling of an automobile occurs in the operating set 50 for game machines.

[0088] By using a response means 51 to have vibrator 53, in this way, when vibration produced at the target of imagination of operation and the same vibration arise in the operating set 50 for game machines according to the advance situation of the game unfolded on the screen of a monitor, the user who operates the operating set 50 for game machines concerned can experience a game with presence.

[0089] In addition, as shown in drawing 26 which attaches and shows the same sign to a corresponding point not only with this but drawing 16 , you may make it this invention vibrate vibrator 74 therefore to the one magnetic substance 71 in the form of the 2nd operation of a ****, although the case where between the two magnetic substance 55 and 56 was made for vibrator 53 to move reciprocately was described.

[0090] in this case, loosely fitting which vibrator 74 forms a coil 73 only in one edge of the cylindrical shape-like coil bobbin 72, and is formed in this coil 73 between magnetic pole section 71A of the magnetic substance 71, and 71B -- a hole -- it is made to fit loosely into 71E the case where the coil bobbin 72 moves most rightward (namely, direction which faces to the magnetic substance 71) in the formation field of the coil 73 formed in the coil bobbin 72 at this time, and the case where it moves most leftward (namely, direction which separates from the magnetic substance 71) -- respectively -- alike -- setting -- any -- loosely fitting -- a hole -- it is set up so that a coil 73 may exist in the position which crosses the magnetic flux in 71E

[0091] Thus, by making it the composition which therefore vibrates vibrator 74 to the one magnetic substance 71, the size can be made small as the response means 70 whole.

[0092] Moreover, although the case where the coil bobbin 57 in which coils 58 and 59 (drawing 15 and drawing 16) were formed was vibrated as vibrator 53 in the form of the 2nd operation of a **** was described As shown in drawing 27 and drawing 28 which attach and show the same sign to a corresponding point not only with this but drawing 15 and drawing 16 , this invention makes coils 58 and 59 a stator, and you may make it vibrate the magnetic substance 81 and 82 as vibrator.

[0093] namely, drawing 27 -- setting -- the response means 75 -- the upper case 2 of the operating set for game machines -- and -- or the coil bobbins 77A and 77B are fixed to the supporter material 76A and 76B fixed to the lower case 3 Coils 58 and 59 wind an electric conduction line around a retrose mutually, and are formed in these coil bobbins 77A and 77B.

[0094] As a cross section is shown in drawing 28 , the magnetic substance 81 and 82 has the magnetic pole sections 81A and 82A of the shape of a cylindrical shape which protruded on the core, respectively, and has the magnetic pole sections 81B and 82B in a circle in the position which separates a predetermined gap on the circumferential side of the magnetic pole sections 81A and 82A, and counters it.
[0095] loosely fitting in which the magnetic substance 81 is formed between magnetic pole section 81A and 81B -- a hole -- loosely fitting in which it is held so that a coil 58 may be fitted loosely into 81E, and the magnetic substance 82 is formed between magnetic pole section 82A and 82B -- a hole -- it is held so that a coil 59 may be fitted loosely into 82E Moreover, at the tooth back, it is fixed to one and, therefore, the magnetic substance 81 and 82 of each other is held free [movement right and left] at the hanging section 60.
[0096] By adding drive current to coils 58 and 59 by turns like the case where it mentions above, about drawing 18 in this way, the unified magnetic substance 81 and 82 can be vibrated, and vibration of the magnetic substance 81 and 82 concerned is transmitted to the whole operating set for game machines through the supporter material 76A and 76B.
[0097] Moreover, as shown not only in this but in drawing 29 , this invention makes a coil 88 a stator and you may make it vibrate the magnetic substance 90 as vibrator in the gestalt of the 2nd operation of a ****, although the case where the coil bobbin 57 in which coils 58 and 59 (drawing 15 and drawing 16) were formed was vibrated as vibrator 53 was described.
[0098] namely, drawing 29 -- setting -- the response means 85 -- the upper case 2 of the operating set for game machines -- and -- or the coil bobbin 87 is fixed between supporter material 86A fixed to the lower case 3, and 86B, an electric conduction line is wound around the coil bobbin 87 concerned, and the coil 88 is formed
[0099] A predetermined gap is separated to this coil 88, the magnetic substance 90 in a circle fits in loosely, and, therefore, it is held free [vibration] to the opposite direction with the direction of arrow a, and this at the spring 89. Therefore in the state where drive current is not added to a coil 88, the magnetic substance 90 is held near the simultaneously center of a coil 88 at a spring 89.
[0100] As this state is shown in drawing 30 (A), by adding drive current I in the predetermined direction of a coil 88, a magnetic field with a coil 88 is formed and the force F which moves in drawing 30 (A) rightward (direction which goes to supporter material 86B) joins the magnetic substance 90. Consequently, the magnetic substance 90 moves to the supporter material 86B side.
[0101] On the other hand, if the sense of the current added to a coil 88 is switched to a retrose, as shown in drawing 30 (B), with the case of drawing 30 (A), force-F of a retrose will join the magnetic substance 90. Consequently, the magnetic substance 90 moves to the supporter material 86A side. Thus, the magnetic substance 90 can be vibrated right and left by switching the sense of the current added to a coil 88.
[0102] Vibration of the magnetic substance 90 concerned is transmitted to the whole operating set for game machines through the supporter material 86A and 86B in this way.
[0103] Moreover, although the case where the operating set 50 for game machines was therefore constituted was stated to the upper case 2 and the lower case 3 which become by rigid resin, therefore this invention forms not only this but some of the upper cases 2 concerned and the lower cases 3 in an elastic member, and you may make it vibrate the elastic member concerned therefore to the above-mentioned response meanses 51, 70, and 75 or 85 in the form of the 2nd operation of a ****.
[0104] Namely, drawing 31 which attaches and shows the same sign to a corresponding point with drawing 9 In the 1st operation supporter 4 which it is made to vibrate the response means 75 therefore, and grips and supports the elastic members 37A and 37B prepared in some of upper cases 2 and lower cases 3, respectively in the left palm As notching and its notching section are closed for a part of part which a palm contacts, elastic members 37A and 37B are attached. these elastic members 37A and 37B -- from the interior -- relative -- or -- partial -- extruding -- making -- deformation -- or it carries out pinch-and-swell -- making -- it -- therefore -- a palm -- it has structure to which the somesthesis of the so-called response which gives dynamic transfer inside is made to feed back
[0105] in addition -- as elastic members 37A and 37B -- for example, a rubber member and a resin -- a member or cloth -- a member etc. can be used
[0106] The response means 75 has structure which equipped with elastic members 37A and 37B as cut and plugged up notching and the lacked portion for a part of part which the palm of the 1st operation supporter 4 of the upper case 2 and the lower case 3 contacts. And as shown in the interior at drawing 32 and drawing 33 , therefore, the response means 75 is held in the direction which may move the vibrator (magnetic substance 81 and 82) up and down at the hanging section 60.
[0107] In this case, the coil 58 of the response means 75 is fixed to elastic member 37B of the lower case 3 with the coil bobbin 77A (drawing 28), and the coil 59 is being fixed to elastic member 37A of the upper case 2 with the coil bobbin 77B (drawing 28). Moreover, magnetic pole section 81A (drawing 33) of the shape of a cylindrical shape of

the magnetic substance 81 Elastic member 37B of the lower case 3 is contacted through the interior of pillar-like coil bobbin 77A (drawing 28) in which the coil 58 was formed. Magnetic pole section 82A (drawing 32 and drawing 33) of the shape of a cylindrical shape of the magnetic substance 82 is in contact with elastic member 37A of the upper case 2 through the interior of pillar-like coil bobbin 77B (drawing 28) in which the coil 59 was formed.
[0108] In this state, by adding drive current to coils 58 and 59 by turns, vibrator (magnetic substance 81 and 82) vibrates in the vertical direction, and, therefore, elastic members 37B and 37A carry out pinch-and-swell to each magnetic pole sections 81A and 82A. Consequently, in the top and bottom position of a part where the palm of the 1st operation supporter 4 contacts, elastic members 37A and 37B can raise outside the presence therefore given to a user to the feel and feedback function by dynamic transfer in a palm deformation or by carrying out pinch-and-swell.
[0109] Moreover, although the case where the operating set 50 for game machines was therefore constituted was stated to the upper case 2 and the lower case 3 which become by rigid resin in the form of the 2nd operation of a **** Therefore this invention forms in an elastic member the part which a palm contacts, and you may make it vibrate the elastic member concerned therefore to the above-mentioned response meanses 51, 70, and 75 or 85 in the 1st operation supporter 4 which not only this but a user grips and supports in the left palm. That is, it is made for drawing 34 and drawing 35 which attached and show the same sign to a corresponding point with drawing 12 and drawing 13 to vibrate the elastic member 42 prepared in a part of operation supporter 4 therefore for the response means 75, and, therefore, the response means 75 is held to the interior at the hanging section 60.
[0110] In drawing 35 , supporter material 76A is fixed to the upper case 2 or the lower case 3, and coil bobbin 77B (drawing 28) which formed the coil 59 in the supporter material concerned with the hanging section 60 is being fixed. Moreover, coil bobbin 77A (drawing 28) in which the coil 58 was formed was fixed to the inside side of an elastic member 42, and magnetic pole section 81A of the magnetic substance 81 has contacted through the interior of the coil bobbin 77A concerned.
[0111] therefore, the thing for which drive current is added to coils 58 and 59 by turns -- the magnetic substance 81 and 82 -- the direction of arrow a, and this -- an opposite direction -- vibrating -- consequently, magnetic pole section 81A of the magnetic substance 81 -- an elastic member 42 -- an outside -- deformation -- or it carries out pinch-and-swell A user's presence can be raised by transmitting the dynamic transfer as somesthesis to a user through the palm which contacts an elastic member 42 in this way.
[0112] Moreover, in the gestalt of the 2nd operation of a ****, although the case where vibrator was vibrated linearly was described, this invention may use not only for this but for a predetermined curve the oscillating method which carries out ****** reciprocating movement.
[0113] Moreover, in the gestalt of the 2nd operation of a ****, although the case where vibrator was therefore hung to flat spring 62 was described, this invention can use other various hanging meanses, such as not only this but coiled spring. In this case, you may make it the number of hanging meanses hang vibrator from two or more places not only using one but using two or more hanging meanses.
[0114] Moreover, although the case where the current value in each timing of the drive current added to each coil of the response means 51 (70, 75, 85) was transmitted to the operating set 50 for game machines by packet data from the main part 27 of a game machine in the form of the 2nd operation of a **** was described this invention transmits the data not only showing this but the configuration of drive current wave type to the operating set 50 for game machines from the main part 27 of a game machine, and you may make it generate the current wave form according to the data point by the operating-set 50 side for game machines concerned.
[0115] (3) while the response means 130 is formed in the response means arrangement section 133 which drawing 36 which attaches and shows the same sign to a corresponding point with form drawing 1 of the 3rd operation showed the form of operation of the 3rd of the operating set for game machines by this invention, and was formed in the interior of the 1st operation supporter 4 of the lower case 3 almost horizontally -- the lower case 3 concerned -- the angular-velocity sensor (gyroscope sensor) 155 of the operating set 120 for game machines concerned is mostly formed in a central field
[0116] the response means 130 has six sides, as shown in drawing 37 -- almost -- the inside of the case 131 of a cube configuration -- vibration -- therefore, the member 140 is hung by two or more coiled spring 151A-151H free [vibration]
[0117] this vibration -- a member 140, as shown in drawing 38 which attaches and shows the same sign to a corresponding point with drawing 37 With X shaft vibration children 141A and 141B who vibrate to X shaft orientations, and Y shaft vibration children 141C and 141D who vibrate to Y shaft orientations Z shaft vibration children 141E and 141F who vibrate to Z shaft orientations -- having -- each vibrator 141A-141F -- vibration -- it is fixed by part for the core of a member 140, and is unified as a whole
[0118] An electric conduction line is wound around an iron core in the same direction at X shaft vibration children

141A and 141B, respectively, and Coils 143A and 143B are formed. Therefore, if drive current I is energized in the coils 143A and 143B concerned, magnetic fields Ha and Hb will occur in the direction according to the sense of the drive current I concerned.

[0119] While X shaft vibration child 141A moves in the direction which approaches the magnet 132A concerned by receiving attraction from magnet 132A of the case 131 (drawing 37) which counters the point of the X shaft vibration child 141A concerned at this time By receiving repulsive force from magnet 132B of the case 131 (drawing 37) which counters the point of the X shaft vibration child 141B concerned, X shaft vibration child 141B moves in the direction which separates from concerned magnet 132B. consequently, vibration united with X shaft vibration children 141A and 141B -- a member 140 moves to a direction (the right direction of the X-axis) like X shaft vibration children 141A and 141B as a whole

[0120] On the other hand, when drive current I energizes the drive current (-I) of a retrose in the coils 143A and 143B of the X-axis signal children 141A and 141B concerned, it is a magnetic field to the direction according to the sense of the drive current-I concerned. - Ha and -Hb occur.

[0121] While X shaft vibration child 141A moves in the direction which separates from concerned magnet 132A by receiving repulsive force from magnet 132A at this time, X shaft vibration child 141B moves in the direction close to the magnet 132B concerned by receiving attraction from magnet 132B. consequently, vibration united with X shaft vibration children 141A and 141B -- a member 140 moves to a direction (the negative direction of the X-axis) like X shaft vibration children 141A and 141B as a whole

[0122] changing the sense of the drive current I energized to X shaft vibration children 141A and 141B in this way for a short time -- vibration -- a member 140 vibrates between magnet 132A and 132B to X shaft orientations as a whole

[0123] Moreover, Y shaft vibration children 141C and 141D vibrate to Y shaft orientations between magnet 132C of the case 131 (drawing 37) which counters each point, and 132D by energizing switching the direction for drive current to the coils 143C and 143D similarly wound around the Y shaft vibration children 141C and 141D concerned, respectively also in Y shaft vibration children 141C and 141D. consequently, vibration united with Y shaft vibration children 141C and 141D -- a member 140 vibrates in a direction (Y shaft orientations) like Y shaft vibration children 141C and 141D as a whole

[0124] Furthermore, Z shaft vibration children 141E and 141F vibrate to Z shaft orientations between magnet 132E of the case 131 (drawing 37) which counters each point, and 132F by energizing switching the direction for drive current to the coils 143E and 143F similarly wound around the Z shaft vibration children 141E and 141F concerned, respectively also in Z shaft vibration children 141E and 141F. consequently, vibration united with Z shaft vibration children 141E and 141F -- a member 140 vibrates in a direction (Z shaft orientations) like Z shaft vibration children 141E and 141F as a whole

[0125] if the period which switches the energization direction of drive current I is incidentally changed -- vibration -- if the oscillation frequency of a member 140 can be changed and the current value of drive current I is changed -- vibration -- the force (namely, acceleration) of joining a member 140 can be changed

[0126] the coils 143A-143F corresponding to each shaft in this way -- drive current I -- energizing -- vibration -- if a member 140 is vibrated, this vibration will be transmitted to the 1st operation supporter 4 through the response means arrangement section 133 (drawing 36), as shown in drawing 39 As for vibration transmitted to the 1st operation supporter 4, the whole **** intermediary equipment comes to vibrate to the case of the 1st operation supporter 4 lower case 3 and upper case 2 concerned. thus, vibration -- vibrational states, such as the direction of vibration therefore generated in a member 140, an amplitude, and acceleration, -- vibration of the response means 130 -- therefore, arbitration can be changed to the drive current I added to each coils 143A-143F prepared in the member 140

[0127] Incidentally, as space which can set the response means 130, as are shown in drawing 40 , and the 1st operation supporter 4 or the 2nd operation supporter 5 gripped and supported in the palm can be used and it is further shown in drawing 41 , the space for a simultaneously core of the operating set 120 for game machines inserted into the 1st operation supporter 4 and 5 can be formed greatly, and this field can be used.

[0128] The response means 130 thus, for example, by having attached in the part gripped and supported with the 1st operation supporter 4 of the lower case 3, i.e., a left palm As shown in drawing 42 , in case the operating set 120 for game machines and the main part 27 of a game machine are connected to the monitors 33, such as a television receiver, and a game is performed [when a partner is beaten in the kind of game, for example, the game of a sport combative, the mark is hit by the shooting game and a target of operation receives an attack on a screen by airplane] the specific reply signal of the main part 27 of a game machine -- vibration of the response means 130 -- a member 140 can be vibrated and fixed time vibration of the operating-set 120 whole for game machines can be carried out

[0129] Thus, it can feed back to the user who equipment equipment 120 the very thing causes vibration to operation by a user's operation button, and therefore uses for it as somesthesis, and presence can be raised further.

[0130] It has the covering device material 28 which the CD-ROM driver which is a video record medium is built in, and the main part 27 of a game machine contains CD-ROM in the upper surface of the main part 27 of a game machine as shown in drawing 42 here, and covers, the open/close switch 29 which carries out opening and closing of the covering device material 28, the electric power switch 30 which supplies a power supply, the reset switch 31 which makes an initial state operation of the main part 27 of a game machine, and structure which formed the connection 32 which can connect two operating sets. By connecting the connector 20 of the operating set 120 for game machines to this connection 32, two-way communication with the main part 27 of a game machine becomes possible. In addition, in the form of this operation, the composition which connected one operating set 120 for game machines explains.
[0131] As described above, in order to make the response means 130 drive and to vibrate the operating-set 120 whole for game machines, it is required between the operating set 120 for game machines, and the main part 27 of a game machine to be the composition equipped with the two-way communication function. This two-way communication function can be performed by connecting with the main part 27 of a game machine the connector 20 which performs the operating set 120 for game machines, and bidirectional serial communication, as shown in drawing 43 .
[0132] I/O-interface SIO to which the composition which performs the two-way communication function by the side of the operating set 120 for game machines performs the main part 27 of a game machine, and serial communication, the one-chip microcomputer (this is called microcomputer below) which are parallel I/O interfaces PIO, CPU, RAM, and ROM which input the operation data from two or more operation buttons, and vibration of the response means 130 -- it consists of coil drivers 164 which vibrate a member 140
[0133] The coils 143A and 143B of X shaft vibration children 141A and 141B of a member 140 vibrate by X shaft-orientations drive current SDX from the coil driver 164. vibration -- The coils 143C and 143D of Y shaft vibration children 141C and 141D of a member 140 vibrate by Y shaft-orientations drive current SDY from the coil driver 164. vibration -- vibration -- the coils 143E and 143F of Z shaft vibration children 141E and 141F of a member 140 vibrate by Z shaft-orientations drive current SDZ from the coil driver 164
[0134] If it has structure which prepared serial I/O-interface SIO which performs serial communication between the operating sets 120 for game machines at the main part 27 side of a game machine and the connector 20 of the operating set 120 for game machines is connected, it connects with serial I/O-interface SIO by the side of the operating set 120 for game machines through this connector 20, and has the composition that bidirectional means of communications, i.e., bidirectional serial communication, can be performed. In addition, the detailed composition of others of the main part 27 of a game machine is omitted.
[0135] The signal line and the control line which perform bidirectional serial communication The signal line TXD (Transmit X' for Data) for data transmission which sends data from the main part 27 of a game machine to the operating set 120 for game machines, The signal line RXD (Received X' for Data) for data transmission which sends data to the main part 27 side of a game machine from the operating-set 120 side for game machines, The signal line SCK (Serial Clock) for serial synchronous clocks which extracts data from the signal lines TXD and RXD for each data transmission, the control line DTR for performing establishment, discontinuation, etc. of communication of the operating set 120 for game machines which are a terminal side (Data Terminal Ready) It consists of the control lines DSR for the flow controls for performing a lot of data transfer (Data Set Ready).
[0136] moreover, as shown in the cable which consists of the signal line and the control line which perform this bidirectional serial communication at drawing 43 , the cable 35 for power supplies taken out from the power supply by the side of the main part 27 of a game machine directly other than a signal line and the control line is contained, and this cable 35 for power supplies is connected to the coil driver 164 by the side of the operating set 120 for game machines -- having -- vibration -- the power supply which vibrates a member 140 is supplied
[0137] As mentioned above about drawing 36 here, the angular-velocity sensor 155 which detects the angular rate of rotation of the circumference of each axis of rotation (the X-axis, Y-axis, and Z-axis) of the operating set 120 for game machines concerned is formed in the operating set 120 for game machines. This angular-velocity sensor 155 has Z axial-angle speed sensor 155C which detects the angular rate of rotation of the circumference of X axial-angle speed sensor 155A which detects the angular rate of rotation of the circumference of the X-axis, Y axial-angle speed sensor 155B which detects the angular rate of rotation of the circumference of the Y-axis, and the Z-axis, and the angular-rate-of-rotation component of the circumference of each shaft (the X-axis, Y-axis, and Z-axis) is detected according to angle change of the operating set 120 for game machines.
[0138] Drawing 44 shows the composition of the gyroscope sensor (Gyroscope Sensor) 156 of the piezo-electric oscillatory type which constitutes Z axial-angle speed sensor 155C, and is the constant elastic metal material elinvar (Elinvar) of the right triangle pole. Material 156D is provided so that the center line may tend toward Z shaft orientations. On the front face of this constant elastic metal material elinvar material 156, piezo-electric ceramic element 156A, By detecting Coriolis force for the movement component of the circumference of the Z-axis of the

movement of the operating set 120 for game machines to which 156B and 156C were stuck on, and the gyroscope sensor 156 concerned was fixed Vibration of constant elastic metal material elinvar material 156D is changed into vibratory torque equal to the vibration frequency of a tuning fork, and it is made as [take / as an amount of displacement of voltage / the angular-rate-of-rotation component of the circumference of the Z-axis / this].
[0139] It is prepared so that the gyroscope sensor of composition as well as the gyroscope sensor 156 shown in drawing 44 also in X axial-angle speed sensor 155A and Y axial-angle speed sensor 155B may incidentally tend toward X shaft orientations and Y shaft orientations, respectively.
[0140] Oscillator-circuit 155E vibrates the piezo-electric ceramic element 156A concerned by sending out oscillation signal S156A to piezo-electric ceramic element 156A for excitation by drawing 45 showing the composition of Z axial-angle speed sensor 155C containing the gyroscope sensor 156 here. By reaching like other two piezo-electric ceramic elements 156B and 156C at the time of no rotating, vibration of piezo-electric ceramic element 156A for excitation is doubled with the phase according [oscillating detecting-signal S156B and S156C of a respectively equal amplitude] to phase-compensator 156G from these two piezo-electric ceramic elements 156B and 156C, and is sent out to differential-amplifier circuit 156F.
[0141] The signal level of differential-amplifier output signal S156F outputted from differential-amplifier circuit 156F at this time is mostly set to "0", and the voltage value of angular-velocity detecting-signal S155Z outputted from direct-current amplifying-circuit 156I is also set to about 0 [V] according to this.
[0142] On the other hand, when the operating set 120 for game machines is operated, according to the rotation component of the circumference of the Z-axis of the movement concerned, the gyroscope sensor (constant elastic metal material elinvar material 156D) of Z axial-angle speed sensor 155C receives a strain, and the amplitude of oscillating detecting-signal S156B outputted from two piezo-electric ceramic elements 156B and 156C and S156C serves as a mutually different value.
[0143] Thereby, differential-amplifier output signal S156F of the signal level according to the amplitude difference are sent out to detector-circuit 156H from differential-amplifier circuit 156F. The signal level of differential-amplifier output signal S156F detects the component by the side of positive, and detector-circuit 156H send this out to direct-current amplifying-circuit 156I.
[0144] Direct-current amplifying-circuit 156I outputs angular-velocity detecting-signal S155Z of the voltage level according to the angular-rate-of-rotation component of the circumference of the Z-axis of the gyroscope sensor 156 by amplifying an in one direction flowed part of the detection output wave sent out from detector-circuit 156H. Thus, angular-velocity detecting-signal S155Z of the circumference of the obtained Z-axis is sent out to an analog / digital conversion circuit 157 in drawing 43 , is changed into a digital signal and sent out to a microcomputer.
[0145] Incidentally, X axial-angle speed sensor 155A and Y axial-angle speed sensor 155B as well as Z axial-angle speed sensor 155C mentioned above about drawing 45 become with composition, and send out angular-velocity detecting-signal S155A according to the angular-rate-of-rotation component of the circumference of the X-axis, and angular-velocity detecting-signal S155B according to the angular-rate-of-rotation component of the circumference of the Y-axis to a microcomputer through an analog / digital conversion circuit 157, respectively.
[0146] each shaft (the X-axis --) with which the microcomputer of the operating set 120 for game machines is obtained from this angular-velocity sensor 155 Based on the angular-rate-of-rotation component of the circumference of a Y-axis and the Z-axis, the posture of the operating set 120 for game machines is judged. vibration -- X shaft-orientations drive current SDX, Y shaft-orientations drive current SDY, and Z shaft-orientations drive current SDZ which are given to a member 140 -- an amendment -- by things vibration hung by the case 131 (drawing 37) -- the oscillating change by the self-weight of a member 140 can be avoided, and the vibration as the data for dynamic transfer always specified to be the main part 27 side of a game machine therefore can be generated
[0147] The bidirectional serial communication procedure performed between the operating set 120 for game machines and the main part 27 of a game machine here For example, in order for the main part 27 of a game machine shown in drawing 43 to communicate with the operating set 120 for game machines and to incorporate the operation data (button information) of the operation button of the 1st - the 4th control unit 7, 8, 9, and 10 First, the main part 27 of a game machine will check that it has therefore been chosen as the control line DTR, and will be in the receiving waiting state of the signal line TXD following it. Then, the main part 27 of a game machine sends out the identification code which shows the operating set 120 for game machines to the signal line TXD for data transmission. Thereby, the equipment equipment 120 for game machines receives this identification code by the signal line TXD.
[0148] By showing the operating set 120 for game machines, identification code starts communication with the main part 27 of a game machine after this. That is, from the main part 27 of a game machine, control data etc. is transmitted to the operating-set 120 side for game machines through the signal line TXD for data transmission, and the operation data operated with the operation button are conversely transmitted to the main part 27 of a game machine through the

signal line RXD for data transmission from the operating set 120 for game machines. Thus, serial communication bidirectional in between the main part 27 of a game machine and the operating sets 120 for game machines is performed, and this communication is ended when the main part 27 of a game machine outputs selection stop data through the control line DTR.

[0149] if it has such bidirectional serial communication facility, while mainly being able to transmit the operation data of an operation button to the main part 27 side of a game machine from the operating-set 120 side for game machines -- the signal line TXD for the data transmission from the main part 27 side of a game machine -- minding -- vibration of the response means 130 -- the data for dynamic transfer which vibrate a member 140 can be sent out to the operating-set 120 side for game machines this vibration -- therefore, the data for dynamic transfer which vibrate a member 140 are beforehand set as CD-ROM for games carried in the main part 27 of a game machine, and feedback by dynamic transfer of fixed time is performed to operating-set 120 the very thing for game machines from the main part 27 of a game machine according to the target of the user who performs a game of operation

[0150] thus, the data transmitted and received between the main part 27 of a game machine and the operating set 120 for game machines consist of 5 bytes of data, as shown in drawing 46 -- having -- every byte -- a packet -- it is-izing and transmitted

[0151] The data transmitted to the operating set 120 for game machines through a signal line TXD in drawing 46 from the main part 27 of a game machine The data 0x01 expressed with a hexadecimal as a protocol identifier and 0x42 are transmitted to the 1st byte and the 2nd byte. Assignment of data is unfixed and the 3rd byte of oscillating control data [as opposed to the response means 130 (vibration member 140) of the operating set 120 for game machines as dynamic transfer / the 4th byte and the 5th byte of / data TXD1 and TXD2] is transmitted.

[0152] namely, -- as the data for the triplet which the data "01" (binary digit) which express that it is the control command of a rocking equipment to 2 bits of most significants are assigned, and follows this in the 4th byte of data as shown in drawing 47 -- vibration -- oscillating directional-control data DCOM showing the oscillating direction of a member 140 It is assigned.

[0153] vibration which mentioned above this oscillating directional-control data DCOM about drawing 37 -- each direction (the X-axis --) of a member 140 X shaft vibration children 141A and 141B prepared corresponding to the Y-axis and the Z-axis, It is the vibrator prepared corresponding to one of shaft orientations among Y shaft vibration children 141C and 141D and Z shaft vibration children 141E and 141F, or data showing such combination, and, therefore, seven kinds of oscillating directions are specified to be data of a triplet. Incidentally, seven kinds of this oscillating direction is the combination of the combination of the combination of X shaft orientations, Y shaft orientations, Z shaft orientations, X shaft orientations, and Y shaft orientations, X shaft orientations, and Z shaft orientations, Y shaft orientations, and Z shaft orientations, and the combination of all shaft orientations.

[0154] Moreover, oscillating directional-control data DCOM which specify the oscillating direction in the data shown in drawing 47 The oscillating data DX of X shaft orientations are added to the 4th byte of least-significant triplet, the oscillating data DY of Y shaft orientations are added to the 5th byte of most-significant triplet, and the oscillating data DZ of Z shaft orientations are added to the triplet following the oscillating data DY of the Y shaft orientations concerned. Thereby, it is oscillating [the 4th byte of] directional-control data DCOM. According to the oscillating direction therefore specified or its combination, the oscillating data DX, DY, and DZ of each shaft orientations are used.

[0155] These oscillating data DX, DY, and DZ express the current value at the time of therefore vibrating the vibrator of each shaft to the data of a triplet, respectively. the microcomputer of the operating set 120 for game machines By changing each oscillating data DX, DY, and DZ concerned into an analog value, and therefore driving the coil driver 164 (drawing 43) to the analog signal concerned The drive current of current value therefore expressed by the oscillating data DX, DY, and DZ is added to the coil of the vibrator corresponding to the shaft therefore specified to be received data at this time.

[0156] This point is explained to the flow chart of drawing 48 which attaches and shows the same sign to a corresponding point with drawing 23 and drawing 24 , and drawing 49 at a below ****** detail, referring to drawing 36 and drawing 43 .

[0157] The main part 27 of a game machine is equipped with specific CD-ROM for games, and the start of a game is set with the start switch 11 of the operating set 120 for game machines shown in drawing 36 , and various functions are set up by operation of the selection switch 12, and it is in the state where a game is performed by operation of the 4th of the 1st - control units 7, 8, 9, and 10.

[0158] And the microcomputer which becomes a game start from CPU, RAM, and ROM of the operating set 120 for game machines which were shown in ****** and drawing 43 is continuously monitored in the step ST 21 which shows drawing 48 whether the data for dynamic transfer of a hit have been sent through serial I/O-interface SIO through serial

interface SIO from the main part 27 side of a game machine. vibration shown in this data for dynamic transfer at drawing 43 -- the oscillating direction and current-value data of a member 140 are contained and the current which is made to drive the coil driver 164 and is supplied from the main part 27 of a game machine when the data for dynamic transfer are in the data sent from the main part 27 side of a game machine while the game is advancing -- as X shaft-orientations drive current SDX, Y shaft-orientations drive current SDY, and Z shaft-orientations drive current SDZ -- vibration -- predetermined-time supply is carried out at the coils 143A-143F of a member 140

[0159] That is, after judging the dynamic transfer data TXD1 and TXD2 (drawing 47) in the data received by the operating-set 120 side for game machines at a step ST 1, microcomputer processing is carried out in a step ST 2. While the microcomputer incorporates beforehand angular-velocity detecting-signal S155X, S155Y, and S155Z which are obtained from the angular-velocity sensor mentioned above in drawing 44 and drawing 45 in a step ST 31 and judging the posture of the operating set 120 for game machines based on the angular-velocity detecting-signal S155X concerned, S155Y, and S155Z at this time, based on the attitude information concerned, the data TXD1 and TXD2 for dynamic transfer are amended.

[0160] this amendment -- vibration -- as the drive current value impressed to each coils 143A-143F of a member 140 -- vibration -- while a member 140 considers as drive current value which generates magnetism few in the direction therefore pulled to gravity -- vibration -- it is made as [consider / a member 140 / with the direction therefore pulled to gravity / at an opposite direction / as drive current value which generates many magnetism]

[0161] therefore, a vibration also according [******] to gravity at what angle (posture) to the perpendicular direction in the operating set 120 for game machines -- the suitable vibration according to game advance which avoids oscillating change of a member 140 and is therefore set as CPU by the side of the main part 27 of a game machine -- vibration -- therefore, a member 140 can be generated

[0162] Thus, the direction therefore specified to be the oscillating directional-control data DCOM (drawing 47) among the amended dynamic transfer data (X shaft orientations) The oscillating data DX showing the oscillating component of Y shaft orientations and Z shaft orientations, or each of these shaft orientations that be put together The data amended based on DY and DZ are changed into an analog signal in step ST22A, step ST22B, and step ST22C, respectively. Therefore in continuing step ST23A, step ST23B, and step ST23C, the coil driver 164 (drawing 43) is driven to an analog signal, respectively. in this way -- the coil driver 164 to drive current I -- vibration -- the direction specified by supplying the coils 141A-141F of a member 140 in step ST24A, step ST24B, and step ST24C at this time -- vibration -- a member 140 vibrates

[0163] on the other hand, the data supplied to the operating set 120 for game machines from the main part 27 of a game machine are dynamic -- when transfer data TXD1T and TXD2 are not included, the microcomputer of the operating set 120 for game machines awaits the state where a ****** operation button is operated by the step ST 5 from the step ST 1 of drawing 48 If an affirmation result is obtained here, this means that the operation button of the operating set 120 for game machines was operated, and therefore, a microcomputer will incorporate the posture of the operating set 120 for game machines to the continuing step ST 31 from the ****** angular-velocity sensor 155 to angular-velocity detecting-signal S155X, S155Y, and S155Z at this time while incorporating ****** and operation data through parallel I/O-interface PIO to a step ST 6.

[0164] Angular-velocity detecting-signal S155X, S155Y, and S155Z which were inputted into the microcomputer are used as data for amendment based on the posture of the operating set 120 for game machines mentioned above about step ST22A-ST24A, step ST22B-ST24B, and step ST22C-ST24C.

[0165] Moreover, the operation data inputted into the microcomputer are processed in the step ST 2 of drawing 48 , are changed into serial data in a step ST 7, and are transmitted to the main part 27 of a game machine through serial I/O-interface SIO (drawing 43). Then, the operating set 120 for game machines will be in the state of awaiting the data from the main part 27 of a game machine in a step ST 25.

[0166] As shown in drawing 46 , the data transmitted to the main part 27 of a game machine from the operating set 120 for game machines assign the identifier of the operating set 120 for game machines to 4 bits of the 2nd byte of high orders, and assign the data of a data length/2 to the 4 bits of the 2nd byte of the low ranks concerned. Moreover, the identifier (ACK) showing the data concerned being response data is assigned to the 3rd byte, and the data of the button operated in the operating set 120 for game machines are assigned to the 4th byte following this, and the 5th byte.

[0167] If the data from this operating set 120 for game machines are transmitted to the main part 27 of a game machine, the main part 27 of a game machine will receive the data from the operating set 120 for game machines in the step ST 26 shown in drawing 49 , and will distinguish a hit state for comparison with the data of a target of operation, and the serial data which received in a line intermediary and a step ST 9 in the continuing step ST 8.

[0168] When the data of a target of operation and the serial data which received are in agreement here (i.e., when it hits) While displaying the target of operation which carried out the ****** hit on a step ST 10 on the screen of a

monitor from a step ST 9 The data for dynamic transfer are outputted in a step ST 11, it changes into serial data in a step ST 12, and the operating set 120 for game machines is answered as a specific reply signal through serial I/O-interface SIO (drawing 43). if it is detected by the microcomputer of the operating set 120 for game machines as the step ST 1, the step ST 2, and Step ST 3 of drawing 48 explained this data for dynamic transfer -- a power supply -- the vibration from the coil driver 164 (drawing 43) -- the coils 143A-143F of a member 140 are supplied, this is vibrated, and, therefore, the operating-set 120 whole for game machines vibrates to the vibration

[0169] On the other hand, if a negative result is obtained in a step ST 9 (drawing 49) The data of a target of operation and the serial data of this from the operating set 120 for game machines do not correspond, That is, it means having not hit, and at this time, CPU of the main part 27 of a game machine awaits the data from the operating set 120 for ****** game machines to a step ST 27, after displaying a target of operation on a step ST 13 on the screen of a monitor based on a ****** operation button.

[0170] In CPU of the main part 27 of a game machine, data processing is performed to every 1 / 60 seconds (one frame), and the dynamic transfer data TXD1 and TXD2 are also transmitted to the operating set 120 for game machines every [1/] 60 seconds from the main part 27 of a game machine according to this. Therefore, the drive current value energized by each coils 143A-143F of the operating set 120 for game machines and its direction change based on dynamic transfer data every [1/] 60 seconds.

[0171] in this way -- the operating set 120 for game machines from the main part 27 of a game machine -- receiving -- dynamic transfer data -- transmitting -- this -- being based -- vibration -- by vibrating a member 140 in the predetermined direction, the somesthesis according to the game unfolded on the screen of a monitor is fed back to the user who operates the operating set 120 for game machines as vibration of the operating set 120 for game machines, and he can advance the high game of presence much more

[0172] In addition, in the form of the 3rd operation of a ****, as mentioned above about drawing 47 the dynamic transfer data TXD1 and TXD2 transmitted to the operating set 120 for game machines from the main part 27 of a game machine every [1/] 60 seconds -- therefore -- vibration -- by specifying the drive current value added to each coils 143A-143F of a member 140 Although the current value of each coils 143A-143F concerned and its direction described the case where it changed every [1/] 60 seconds by the shortest this invention divides for 1 / 60 seconds in further two or more periods, and you may make it specify drive current value and its direction for every division period by increasing the byte count of the data shown not only in this but in drawing 47 , and transmitting two or more oscillating data DX, DY, and DZ of each shaft orientations.

[0173] thus -- if it carries out -- an one-frame period -- setting -- the number of the oscillating data DX, DY, and DZ -- vibration -- by the ability changing the drive current value added to each coils 143A-143F of a member 140, and its direction the transfer timing of the dynamic transfer data TXD1 and TXD2 transmitted to the operating set 120 for game machines from the main part 27 of a game machine -- one frame (1 / 60 seconds) every -- ****** The drive current which changes like an analog signal by the time interval finer than the one-frame period concerned can be added to each coils 143A-143F.

[0174] Moreover, it sets in the form of the 3rd operation of a ****. vibration, although the case where the current value in each timing of the drive current added to each coils 143A-143F of a member 140 and its direction were transmitted to the operating set 120 for game machines by packet data from the main part 27 of a game machine as dynamic transfer data TXD1 and TXD2 was described this invention transmits the data not only showing this but the configuration of drive current wave type to the operating set 120 for game machines from the main part 27 of a game machine, and you may make it generate the current wave form according to the data point by the operating-set 120 side for game machines concerned.

[0175] moreover, the form of the 3rd operation of a **** -- setting -- a case 131 -- coiled spring 151A-151F -- therefore -- vibration -- although the case where a member 140 was hung was described -- that a hanging means uses not only this but flat spring **** -- further -- a liquid -- vibration -- you may make it make a member 140 float

[0176] moreover, vibration which has a salient as the coil section in the gestalt of the 3rd operation of a **** in each axial (the X-axis, a Y-axis, and Z-axis) direction, although the case where a member 140 was used was described this invention embeds a magnet at each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) of not only this but a spherical member, respectively, and you may make it prepare the coil section of X shaft orientations, Y shaft orientations, and Z shaft orientations in the case side which counters the magnet concerned.

[0177] moreover, the vibrator (X shaft vibration child 141A --) which vibrates in the form of the 3rd operation of a ****, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) vibration which unified 141B, Y shaft vibration children 1412C and 141D, and Z shaft vibration children 141E and 141F -- although the case where a member 140 was used was described, you may make it this invention prepare the vibrator which vibrates individually not only to this but to each shaft orientations, respectively in another object

[0178] In this case, the response means 75 of the voice coil composition mentioned above, for example about drawing 27 and drawing 28 is individually arranged with sense which vibrates, respectively to X shaft orientations, Y shaft orientations, and Z shaft orientations, as shown in drawing 50 . vibration of one which vibration of two or more response meanses 75 to vibrate to each shaft orientations was compounded, and was mentioned above about drawing 37 in this operating set 160 for game machines by giving the oscillating data DX, DY, and DZ of each shaft orientations mentioned above about drawing 47 as drive current value of each response means 75, and vibrating them in such composition -- vibration occurs in the arbitrary directions like a member 140 (drawing 37)

[0179] also in this case, the drive current value which therefore supervises the posture of the operating set 160 for game machines in the angular-velocity sensor 155, and is supplied to each response means 75 -- an amendment -- vibration which was not concerned with the posture but was always specified by things from the main part 27 of a game machine to the operating set 160 for game machines can be generated

[0180] Moreover, although the case where a response means 75 for vibrator to go to a rectilinear and to generate vibration in the direction of one dimension in the operating set 160 for game machines of drawing 50 was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described You may make it this invention establish not only this but the response means 21 by the motor 24 mentioned above about drawing 2 in addition to three response meanses 75 arranged at each shaft orientations, as shown in drawing 51 .

[0181] In this case, the response means 75 of voice coil composition can generate [consumed electric current] many strong vibration, and the response means 21 by the motor 24 notes the point that the consumed electric current generates a few weak vibration. In generating a short-time vibration strongly comparatively In making it combine and vibrate according to the oscillating direction of which the response means 75 of voice coil composition prepared in each shaft orientations is required and generating a weak vibration of comparatively long time While being able to generate vibration of the various directions and strength according to advance of a game with rich presence by driving the response means 21 by the motor 24 By the ability making the big response means 75 of the consumed electric current drive, only when required, the consumed electric current which the vibration as the operating-set 170 whole for game machines concerned takes can be reduced.

[0182] Moreover, in the operating set 160 for game machines of drawing 50 , although the case where a response means 75 for vibrator to go to a rectilinear and to generate vibration was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described, this invention is good also not only as this but a response means 21 by the motor 24 which mentioned above 1 of the response meanses prepared in each shaft orientations, or two about drawing 1 .

[0183] That is, the operating set 180 for game machines shown in drawing 52 shows the case where the response means 21 by the motor 24 mentioned above about drawing 2 is established in the two-dimensional direction of a X-Z flat surface as a means to generate vibration, and has the response means 21 concerned and a response means 75 of voice coil composition to make Y shaft orientations (the direction of one dimension) generate vibration.

[0184] Thus, if the response meanses 75 and 21 are arranged, while being able to make a cross direction feel a strong shock (vibration) to the user who operates the operating set 180 for game machines using the response means 75 of voice coil composition especially, a comparatively small vibration can be made to feel in the direction of four directions for a long time.

[0185] Moreover, although the case where the response means 75 of voice coil composition was arranged, respectively to each shaft orientations (X shaft orientations, Y shaft orientations, and Z shaft orientations) was described in the operating set 160 for game machines of drawing 50 this invention is replaced with the response means 75 of voice coil composition as shown not only in this but in drawing 53 . You may arrange two response meanses 21A and 21B to have a motor 24, respectively so that the oscillating direction may turn into the direction of a X-Z flat surface, and the direction of a Y-Z flat surface (or the direction of a X-Y flat surface).

[0186] According to this operating set 190 for game machines, the various vibration according to advance of a game can be fed back to a user by generating vibration to the two directions of a flat surface. As the oscillating data incidentally transmitted from the main part 27 of a game machine to the operating set 190 for game machines which established two response meanses 21A and 21B are shown in drawing 54 , the data "01" (binary digit) showing being the control command of a rocking equipment are assigned to 2 bits of the 4th byte of most significants, and the analog-control data MA 1 showing the drive current value added to 1st response means 21A are assigned to the 4th byte of the least-significant triplet concerned. Moreover, the analog-control data MA 2 showing the drive current value added to 2nd response means 21B are assigned to the 5th byte of the best triplet. Thereby, the microcomputer of the operating set 190 for game machines which received the two analog-control data MA1 and MA2 concerned energizes the drive current therefore specified to be analog data MA1 and MA2 to each response meanses 21A and 21B by changing the

analog-control data MA1 and MA2 into an analog value, and therefore driving a coil driver to the analog signal concerned.
[0187] Moreover, in drawing 54 , the digital-control data CONTD1 showing whether the drive current of the value beforehand decided to 1st response means 21A is energized are assigned to the 5th byte of least significant bit. By assigning "1" or "0" as this digital-control data CONTD1, it is determined whether energize drive current to 1st response means 21A.
[0188] Moreover, the digital-control data CONTD2 showing whether the drive current of the value beforehand decided to be the 5th byte of least significant to the 2nd bit to 2nd response means 21B is energized are assigned like this. By assigning "1" or "0" as this digital-control data CONTD2, it is determined whether energize drive current to 2nd response means 21B.
[0189] This point is explained to the flow chart of drawing 55 at a below ****** detail. The microcomputer of the operating set 190 (drawing 53) for game machines judges whether the received data concerned are control data over the operating set for game machines with a rocking equipment by detecting 2 bits of the 4th byte of most significants of received data in the continuing step ST 42 from the main part 27 of a game machine, after going into the procedure based on received data and completing reading of data in a step ST 41 from the step ST 2 of drawing 55 , if the data shown in drawing 54 are received.
[0190] If a negative result is obtained here, this will express that received data are not control data over an operating set with a rocking equipment, i.e., it is not the control data over the operating set 190 for game machines connected to the main part 27 of a game machine at this time, and the microcomputer of the operating set 190 for game machines will await ****** and new received data to the above-mentioned step ST 41 at this time.
[0191] On the other hand, it expresses that this is the control data over the operating set 190 for game machines with a rocking equipment in the received data if an affirmation result is obtained in a step ST 42, and the microcomputer of the operating set 190 for game machines concerned judges whether the analog-control data MA 1 to 1st response means 21A exist in the 4th byte of received data in the continuing step ST 43 at this time.
[0192] If an affirmation result is obtained here, it will mean that the analog-control data MA 1 exist to the 4th byte of least-significant triplet of received data, and the microcomputer of the operating set 190 for game machines will add the drive current of the value therefore specified to be a step ST 44 by the analog-control data MA 1 to the motor 24 of response means 21A of ****** 1st at this time.
[0193] On the other hand, if a negative result is obtained in a step ST 43, this means that the analog-control data MA 1 do not exist in the 4th byte of least-significant triplet of received data (for example, the analog-control data MA 1 should be "0"). At this time, the microcomputer of the operating set 190 for game machines The digital-control data CONTD1 to 1st response means 21A currently assigned to a step ST 45 at the 5th byte of least significant bit of ****** received data (drawing 54) are read. Based on the digital-control data CONTD1 concerned, the motor 24 of 1st response means 21A is controlled to ON or an OFF state.
[0194] Then, the microcomputer of the operating set 190 for game machines judges whether the analog-control data MA 2 to 2nd response means 21B exist in a step ST 46 at the 5th byte of ****** and received data.
[0195] If an affirmation result is obtained here, it will mean that the analog-control data MA 2 exist to the 5th byte of most-significant triplet of received data, and the microcomputer of the operating set 190 for game machines will add the drive current of the value therefore specified to be a step ST 47 by the analog-control data MA 2 to the motor 24 of response means 21B of ****** 2nd at this time.
[0196] On the other hand, if a negative result is obtained in a step ST 46, this means that the analog-control data MA 2 do not exist in the 5th byte of most-significant triplet of received data (for example, the analog-control data MA 1 should be "0"). At this time, the microcomputer of the operating set 190 for game machines The digital-control data CONTD2 to 2nd response means 21B currently assigned to a step ST 48 at the 2nd bit are read in the 5th byte of least significant of ****** received data (drawing 54). Based on the digital-control data CONTD2 concerned, the motor 24 of 2nd response means 21B is controlled to ON or an OFF state.
[0197] the analog-control data MA1 and MA2 or the digital-control data CONTD1 and CONTD2 which are contained in received data in this way when the microcomputer of the operating set 190 for game machines repeats the processing shown in drawing 55 whenever it receives data from the main part 27 of a game machine -- being based -- the response meanses 21A and 21B -- analog control -- or a digital control can be carried out
[0198] In this processing, when the analog-control data MA1 and MA2 exist in received data, the drive current of the current value finely specified according to the analog-control data MA1 and MA2, respectively can be added to each motor 24 of the response meanses 21A and 21B by giving priority to and using the analog-control data MA1 and MA2 concerned.
[0199] In addition, although the case where the digital-control data CONTD2 to the 2nd response means 21B

concerned were detected was described in the microcomputer processing shown in drawing 55 when the analog-control data MA 2 to 2nd response means 21B did not exist As this invention is shown in drawing 56 which attaches and shows the same sign to a corresponding point not only with this but drawing 55 When the analog-control data MA 2 to 2nd response means 21B do not exist in received data as a judgment result in a step ST 46, the ** which does not detect the digital-control data CONTD2 to 2nd response means 21B -- a step ST 41 -- ****** -- you may make it await reception of new data

[0200] If it does in this way, in the system which does not assign the digital-control data CONTD2 to 2nd response means 21B, it can judge whether analog control of the 2nd response means 21B is carried out.

[0201] Moreover, although the case where every one analog-control data MA1 and MA2 (triplet) to the 1st and 2nd response meanses 21A and 21B was assigned, respectively was described, you may make it this invention assign two or more analog-control data in the data shown in drawing 54 to the 1st and 2nd response main edges 21A and 21B not only using this but using other free areas, respectively.

[0202] If it does in this way, the timing which sends out the data concerned can change the drive current value to which ****** also adds only the number of the analog-control data to one response means to a response means for every period which divided the one-frame period by every one frame (1 / 60 seconds). Therefore, a response means is controllable to change of the current value thereby near an analog signal.

[0203] Moreover, angular-velocity detecting-signal S155A obtained from the angular-velocity sensor 155 formed in the operating set 120 (drawing 36) for game machines in the form of the 3rd operation of a ****, S155B and S155C -- being based -- the microcomputer by the side of the operating set 120 for game machines -- the posture of the operating set 120 for game machines concerned -- judging -- the posture concerned -- responding -- vibration, although vibration of a member 140 was described about the amendment case this invention Angular-velocity detecting-signal S155A not only from this but an angular-velocity sensor, Once transmit S155B and S155C to the main part 27 side of a game machine, and, therefore, the posture of the operating set 120 for game machines is judged on the microcomputer (CPU) by the side of the main part 27 of a game machine concerned. Before transmitting each oscillating data DX, DY, and DZ of the control data (drawing 54) which this transmits to the operating set 120 for game machines from the main part 27 of a game machine, it is good as for a method of an amendment beforehand.

[0204] Moreover, angular-velocity detecting-signal S155A from the angular-velocity sensor 155 formed in the operating set 120 for game machines in the gestalt of the 3rd operation of a ****, S155B and S155C -- being based -- vibration, although the drive current value added to each coils 1443A-143F of a member 140 was described about the amendment case this invention not only in this For example, angular-velocity detecting-signal S155A from the angular-velocity sensor 155, Based on S155B and S155C, the posture of the operating set 120 for game machines is judged, change of the posture concerned is replaced with a user's operation button input, and you may make it transmit to the main part 27 of a game machine.

[0205] If it does in this way, command input of a user only changing the posture of the operating set 120 for game machines, for example, moving the target of operation on monitor display towards desired, without operating the operation button of the operating set 120 for game machines, can be performed.

[0206] (4) Although the case where the power supply which drives the response means 21 (51, 70, 75, 85,130) was supplied from the main part 27 of a game machine in the form of the form (4-1) above-mentioned 1st of other operations, the 2nd, and the 3rd operation was described You may make it this invention prepare the power supply which drives the response means 21 (51, 70, 75, 85,130) in the operating-set 1 (50, 120, 160, 170, 180, 190) side for game machines, as shown not only in this but in drawing 57 .

[0207] In this case, what is necessary is for operation of the operating set 1 (50, 120, 160, 170, 180, 190) for game machines to form the power supply section 95 for the object for motors, or coils in the position close to the place 20 which does not become inconvenient, for example, the connector linked to the main part 27 of a game machine, to exchange inside, and just to make it equipped with the free battery 96, for example, a dry cell, as shown in drawing 57 . It becomes unnecessary to supply a power supply from the main part 27 of a game machine, and what is necessary will be to change only the cable which composition equivalent to the former is sufficient as the main part 27 of a game machine, and is connected by considering as such composition.

[0208] (4-2) Although the case where presence was therefore given to a user was stated to making the operating set 1 (50, 120, 160, 170, 180, 190) for game machines generate vibration in the form of the above-mentioned 1st, the 2nd, and the 3rd operation this invention not only in this For example, the space by the side of the front part of the start selection section 6 in which the operating set 100 for game machines was narrow as shown in drawing 58 , Or the voice generating section 101 which is a response means is formed in the space of the 1st operation supporter 4 gripped and supported in the left palm, or the 2nd operation supporter 5 gripped and supported in the right palm, and you may make it generate especially heavy low-pitched sound.

[0209] If it is made such composition and it will be made into heavy low-pitched sound while being able to obtain the feedback from the main part 27 of a game machine as somesthesis by the sound in a hand, vibration can also be generated simultaneously and presence can be raised by sound and vibration.
[0210] (4-3) Although the case where presence was therefore given to a user was stated to making the operating set 1 (50, 120, 160, 170, 180, 190) for game machines generate vibration in the form of the above-mentioned 1st, the 2nd, and the 3rd operation You may make it this invention equip the upper surface front position of the start selection section 6 where the operating set 105 for game machines was narrow, as shown in drawing 59 , not only this but the member 106 which emits light as a response means, for example, Light Emitting Diode. In this case, in drawing 59 , although it has structure which prepared one Light Emitting Diode, some may be arranged not only in one piece but in a single tier, and it is good also as a blink state.
[0211] Thus, by preparing the member (106) which emits light as a response means, when a target of operation hits, the presence of having also hit the operating-set 105 side for game machines, when a hand shone can be obtained.
[0212] In the operating set which the user who performs a game in short has in a direct hand, without in addition being limited to the form of the operation which gave [above-mentioned] explanation and which ****** (4-4) When a target of operation hits, it being applicable to all the composition incorporating a certain member which answers is not saying, and it cannot be overemphasized that sound or light may be suitably combined for dynamic transfer of the form of the above-mentioned implementation. Furthermore, although the case where the operating set for game machines performed a certain response according to the game developed on the screen of a monitor in the form of above-mentioned operation was described, this invention can apply this invention also in a game machine with which not only this but a user therefore carries out false experience only to voice.
[0213]
[Effect of the Invention] according to this invention as mentioned above -- change of the target of operation on a game -- a visual sense -- and -- or the thing felt by the acoustic sense -- in addition, by having prepared the fed-back response means in the operating set itself synchronizing with change of a target of operation, the somesthesis of the operating set itself having generated vibration etc. and it having hit to the user can be given, and the game which has presence more can be performed
[0214] Moreover, various control data can be transmitted to the singular number or two or more response meanses by having two or more identification code fields which specify a response means, and control data fields to the response means therefore specified to be the identification code concerned as dynamic transfer data transmitted to the operating set for game machines from the main part of a game machine.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

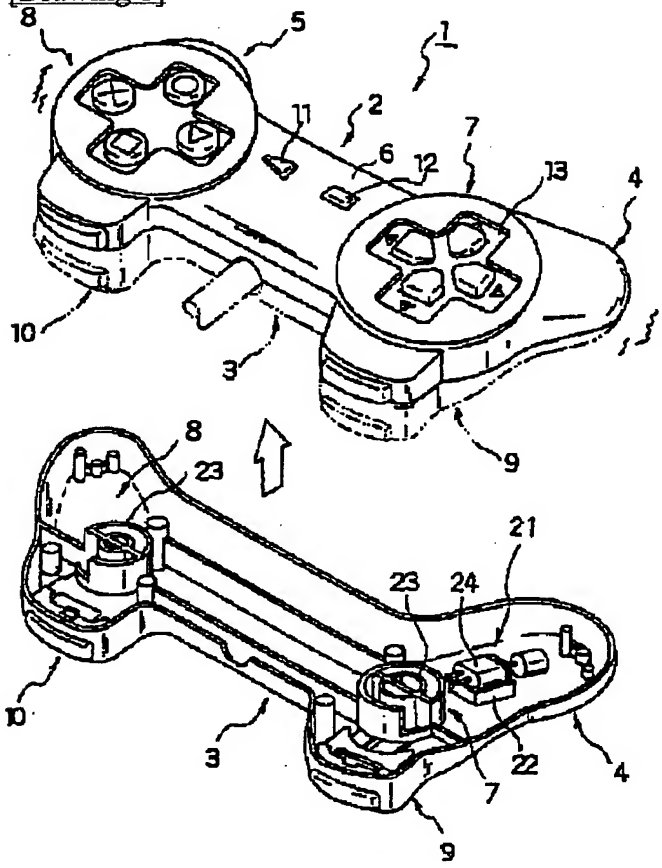


図1　第1の実施の形態の構成

[Drawing 2]

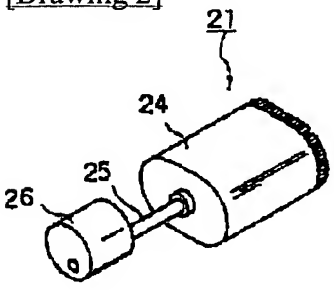


図2　モータ及び重り

[Drawing 3]

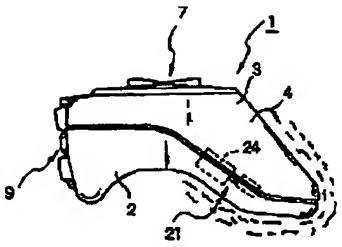


図3 支持部の断面

[Drawing 4]

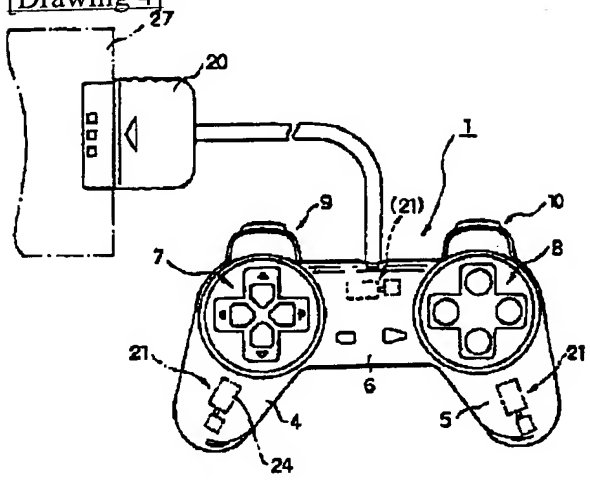


図4 応答手段の配置

[Drawing 11]

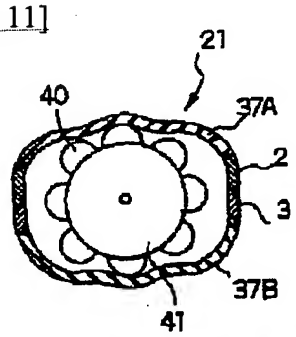


図11 他の実施の形態による操作支持部のA－A断面

[Drawing 5]

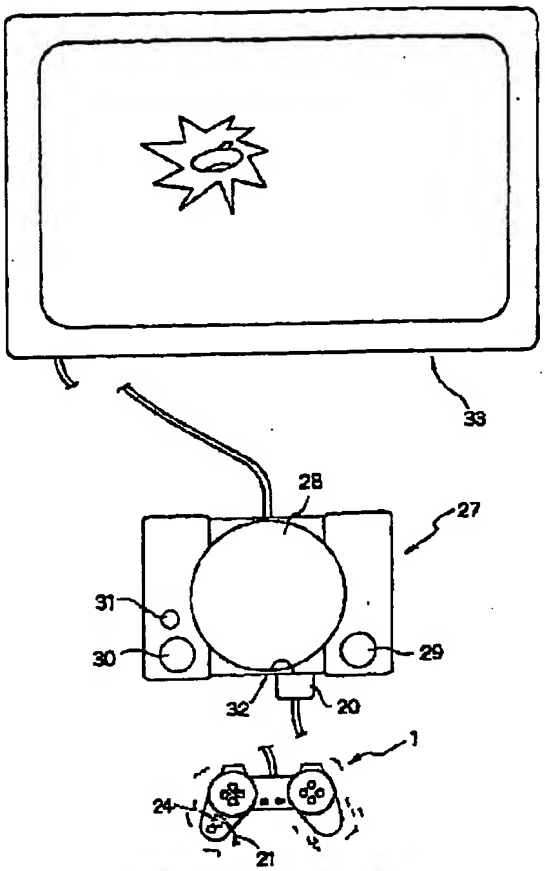


図5　ゲーム機の操作状態

[Drawing 6]

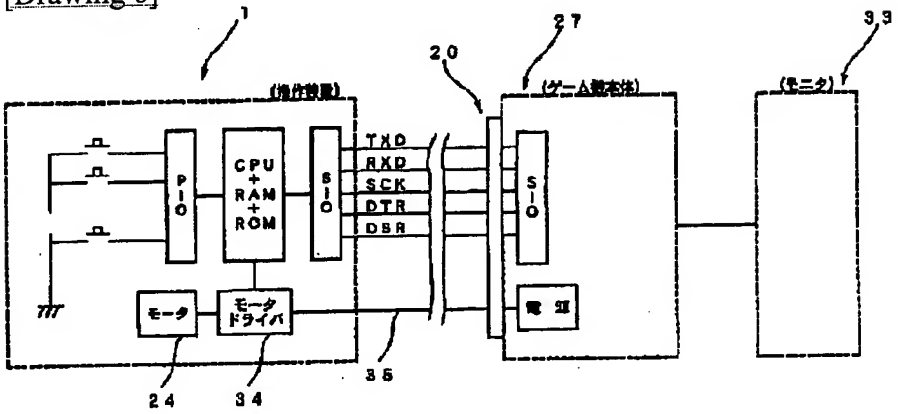


図6　ゲーム機及び操作装置の接続

[Drawing 7]

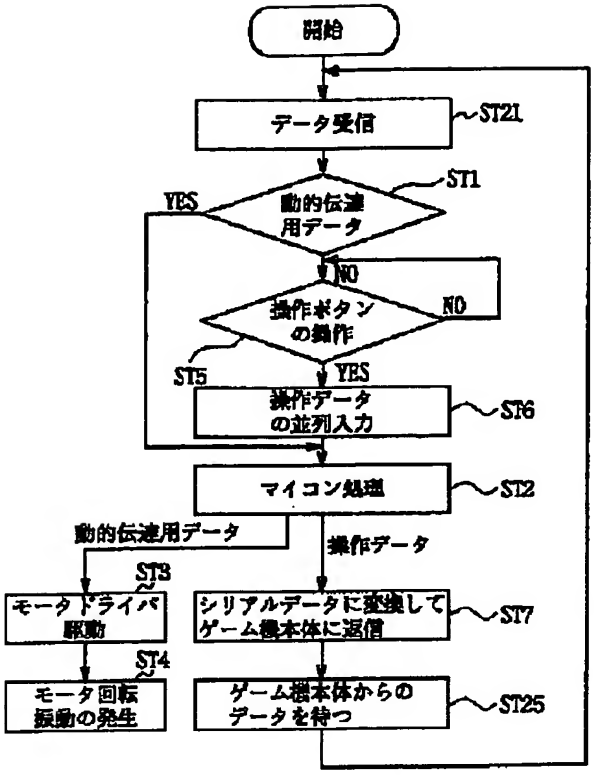


図7　操作装置側の処理手順

[Drawing 8]

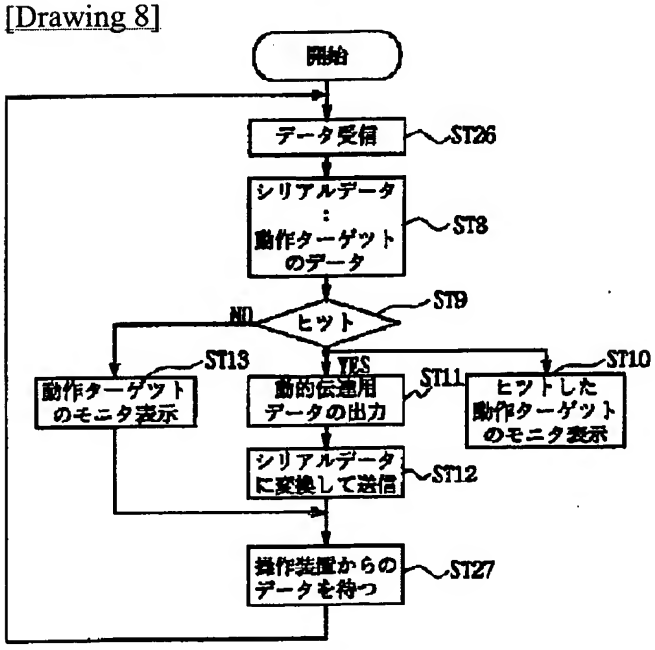


図8　ゲーム機体側の処理手順

[Drawing 9]

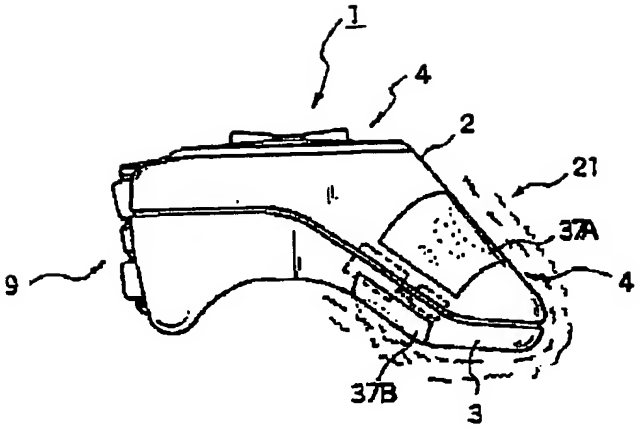


図９　他の実施の形態による操作支持部の振動

[Drawing 10]

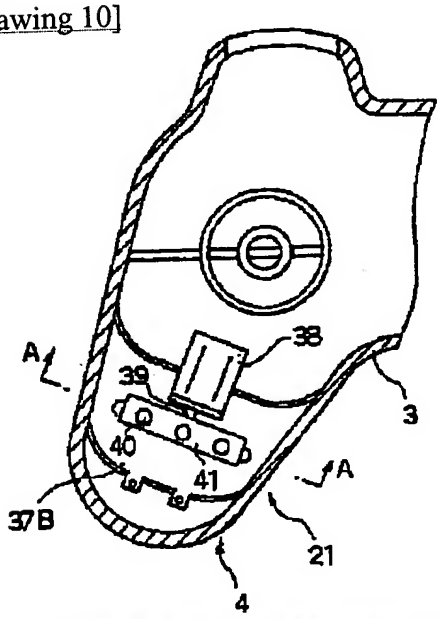


図１０　他の実施の形態による操作支持部の内部構成

[Drawing 12]

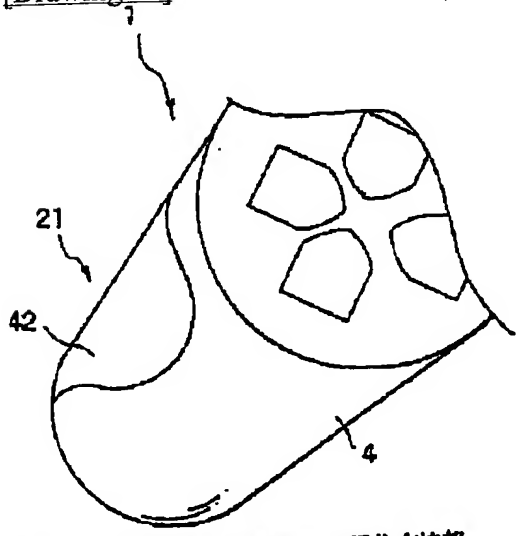


図１２　他の実施の形態による操作支持部

[Drawing 13]

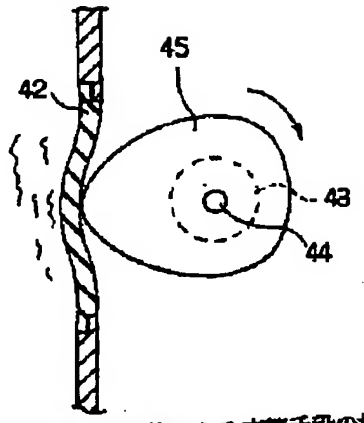


図１３　他の実施の形態による応答手段の構成

[Drawing 14]

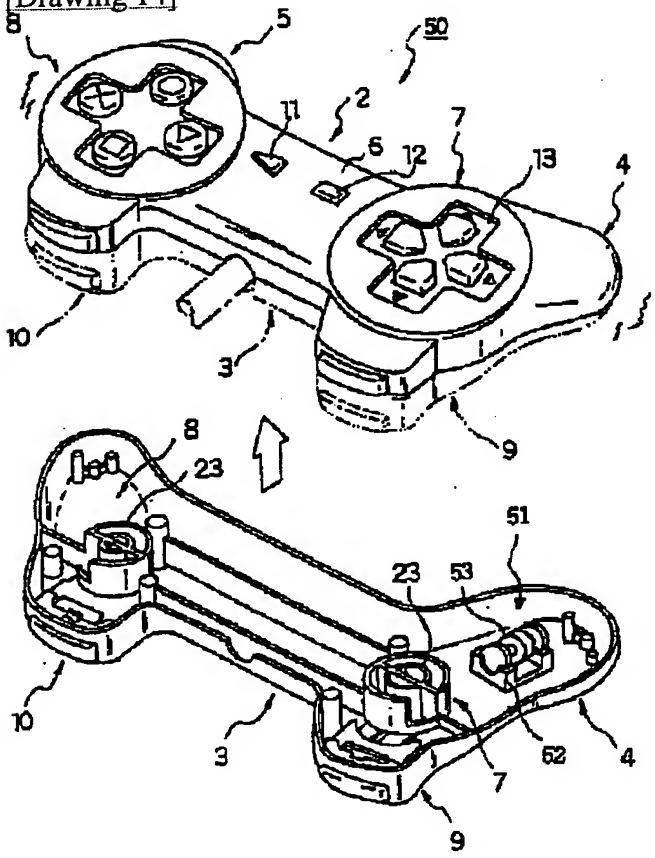


図１４　第２の実施の形態の構成

[Drawing 15]

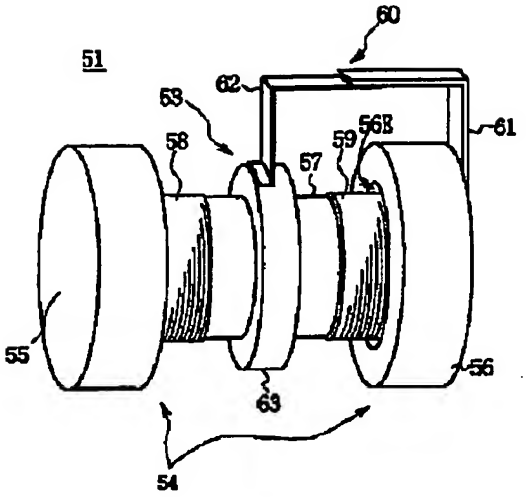


図１５　第２の実施の形態による応答手段の構成

[Drawing 16]

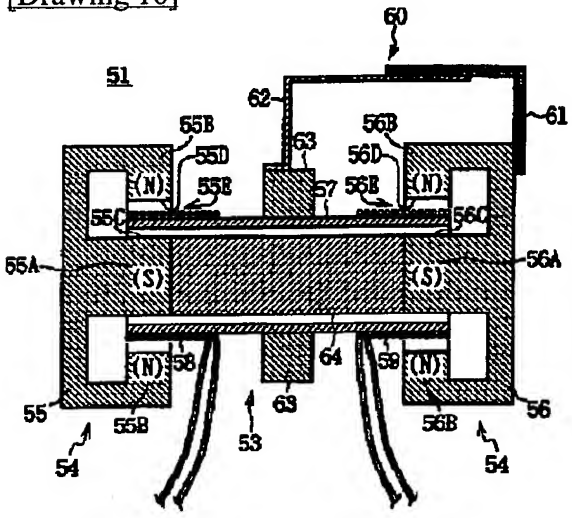


図１６　第２の実施の形態による応答手段の内部構成

[Drawing 17]

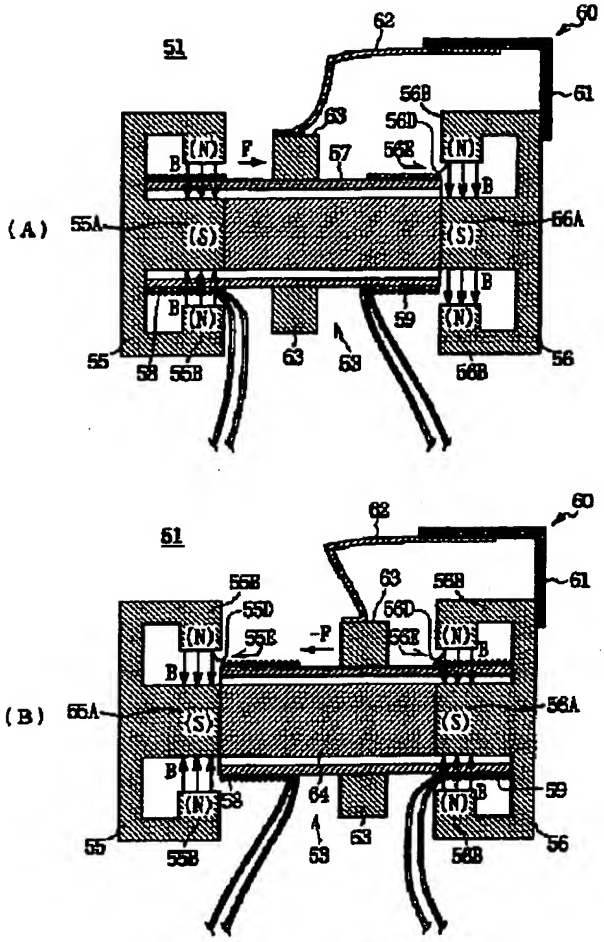
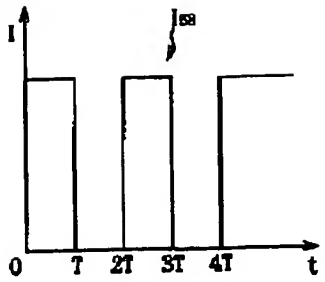


図１７　振動子の動作状態

[Drawing 18]

(A)



(B)

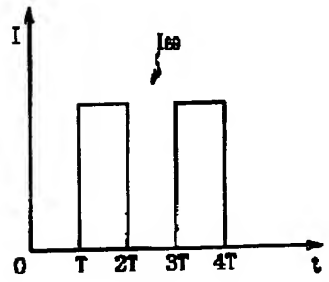


図１８　振動子の駆動電流波形

[Drawing 19]

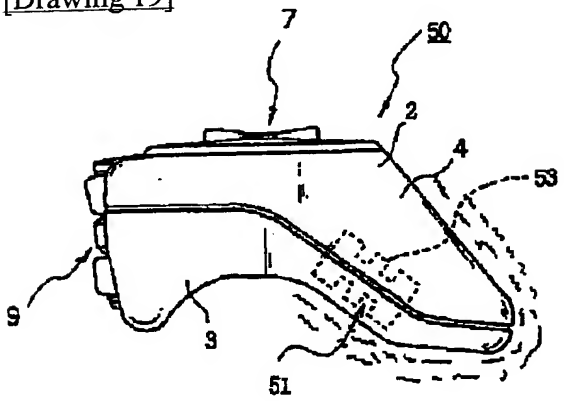


図１９　振動子の振動による操作装置の振動

[Drawing 20]

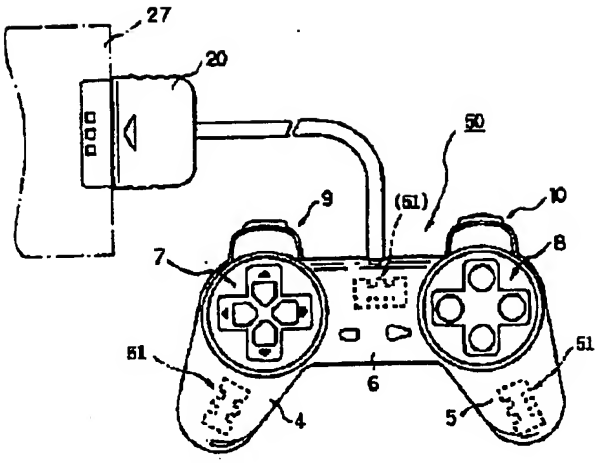


図２０　応答手段の配置

[Drawing 21]

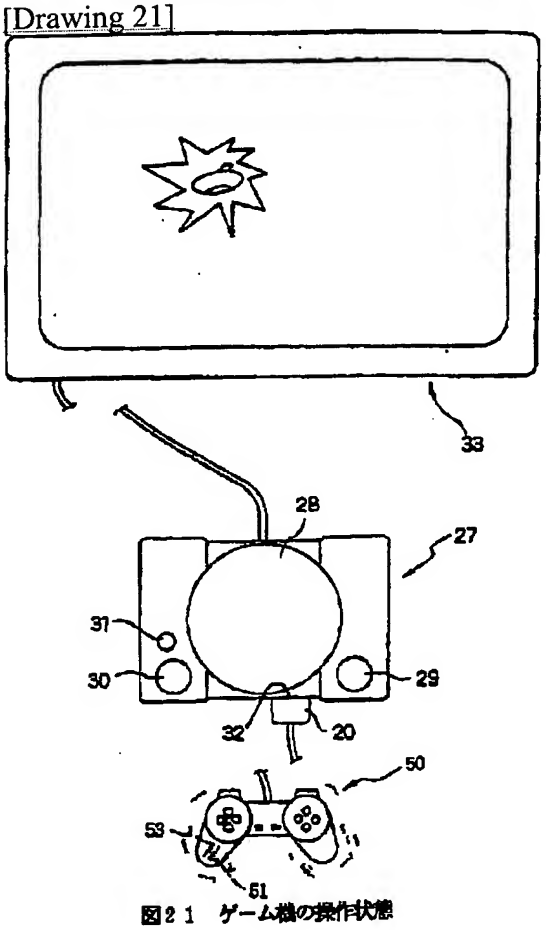


図２１　ゲーム機の操作状態

[Drawing 22]

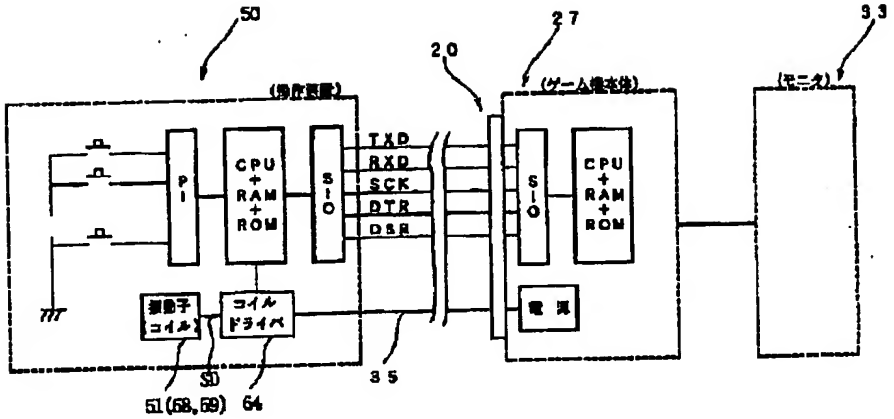


図２２　ゲーム機本体及び操作装置の接続

[Drawing 23]

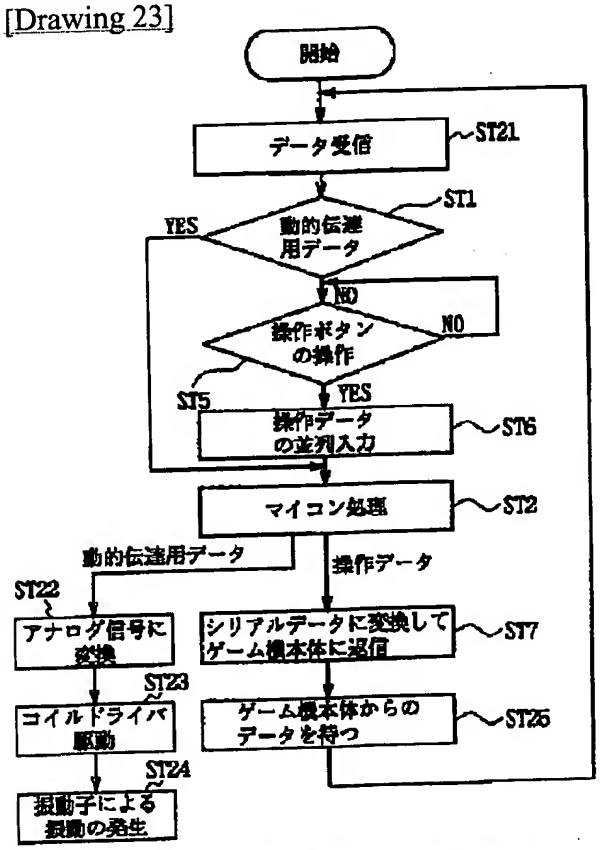


図２３　操作装置側の処理手順

[Drawing 26]

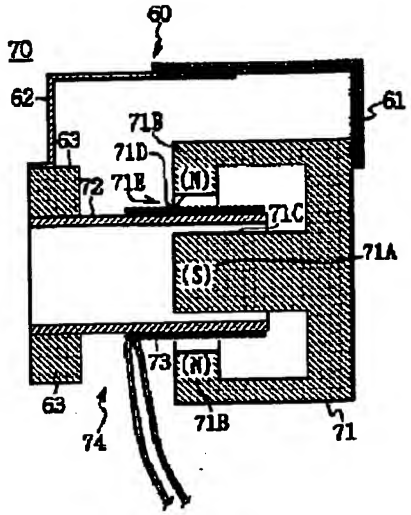


図２６　応答手段の他の実施の形態

[Drawing 24]

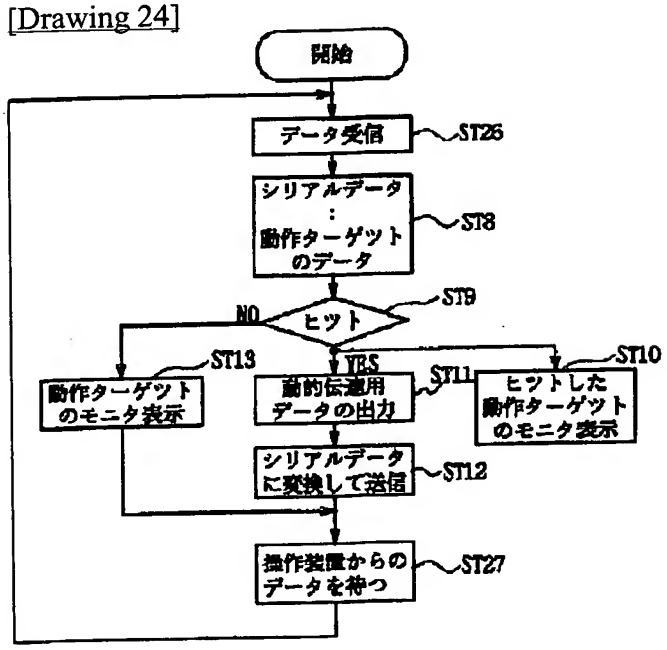


図２４　ゲーム機体側の処理手順

[Drawing 25]

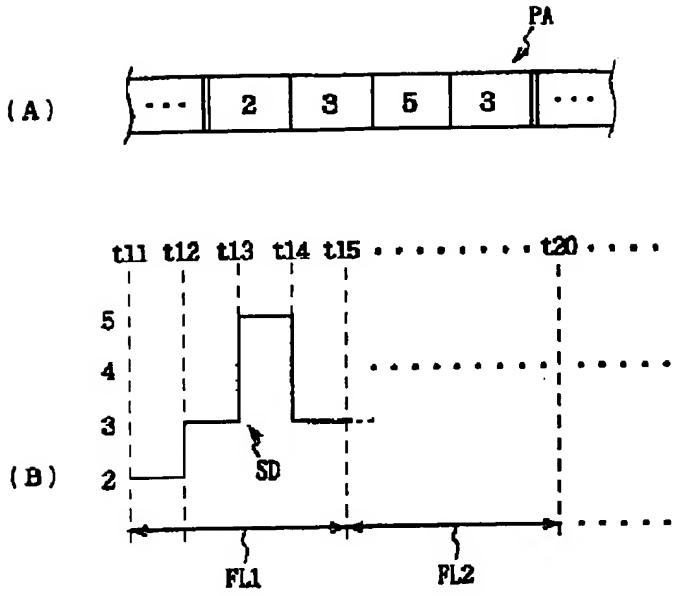


図２５　コイルの駆動信号

[Drawing 27]

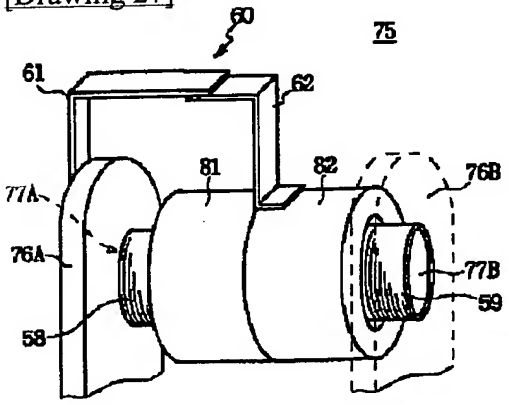


図２７　応答手段の他の実施の形態

[Drawing 28]

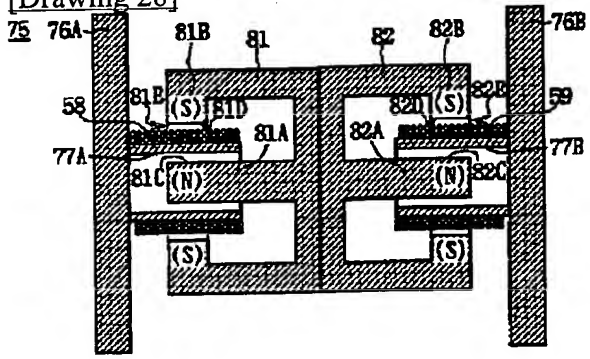


図２８　応答手段の他の実施の形態

[Drawing 33]

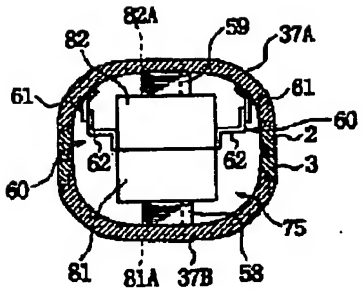


図３３　他の実施の形態による操作支持部のＡ－Ａ断面

[Drawing 29]

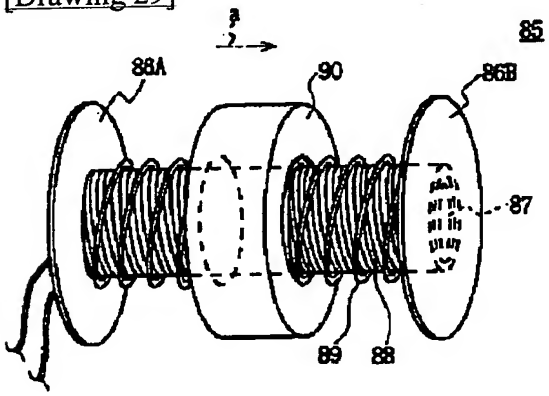


図２９　応答手段の他の実施の形態

[Drawing 30]

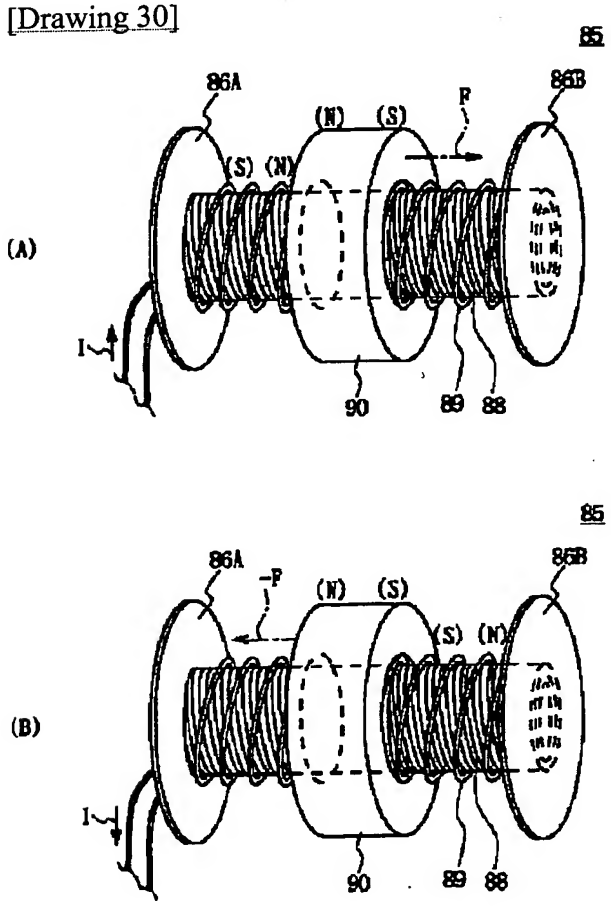


図３０　他の実施の形態の動作

[Drawing 31]

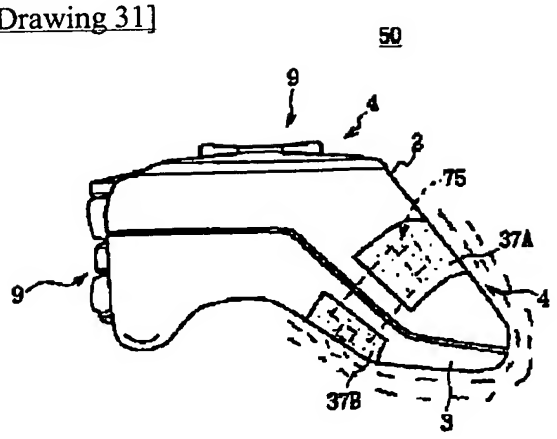


図３１　他の実施の形態による操作支持部の振動

[Drawing 32]

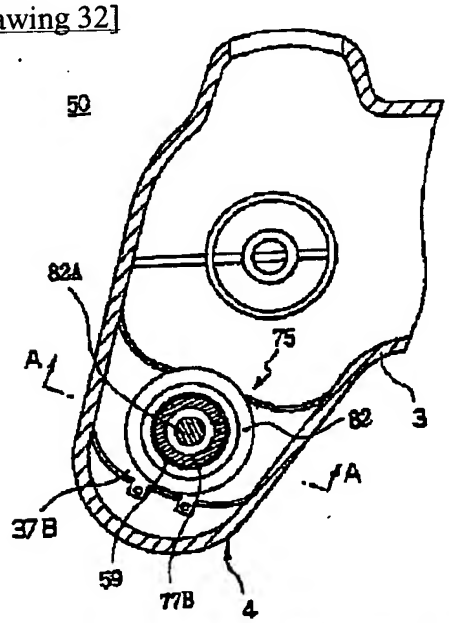


図３２　他の実施の形態による操作支持部の内部構成

[Drawing 34]

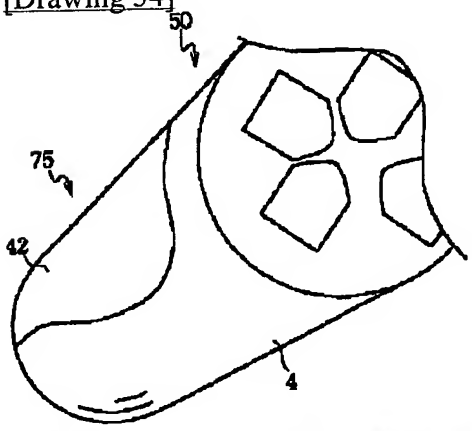


図３４　他の実施の形態による操作支持部

[Drawing 35]

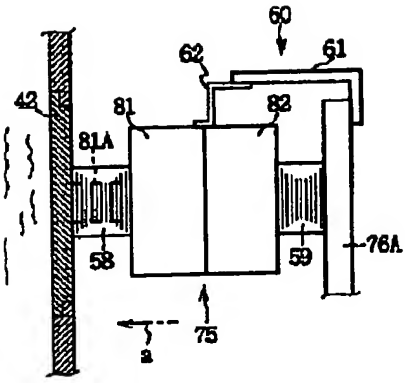


図３５　他の実施の形態による振動部の構成

[Drawing 36]

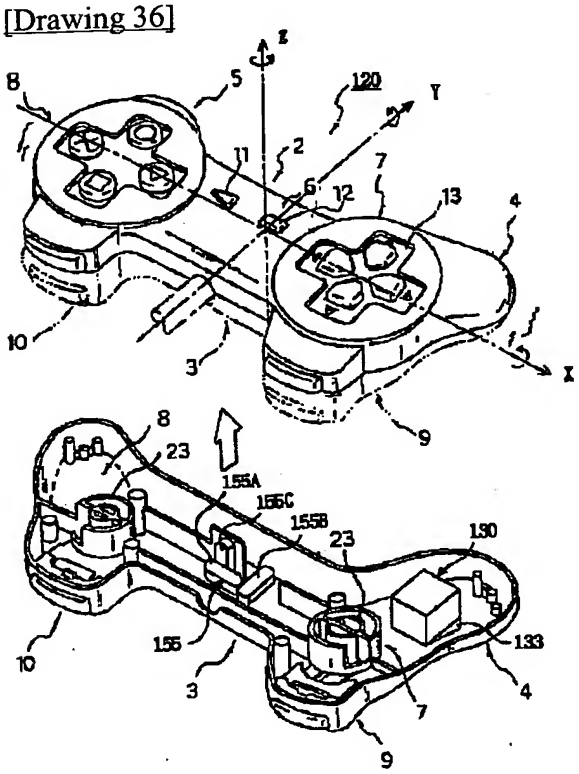


図３６　第３の実施の形態の構成

[Drawing 37]

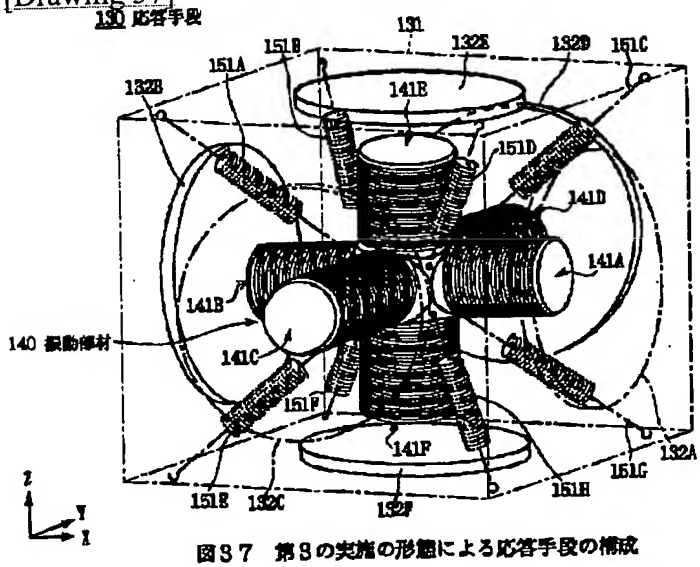


図３７　第３の実施の形態による応答手段の構成

[Drawing 39]

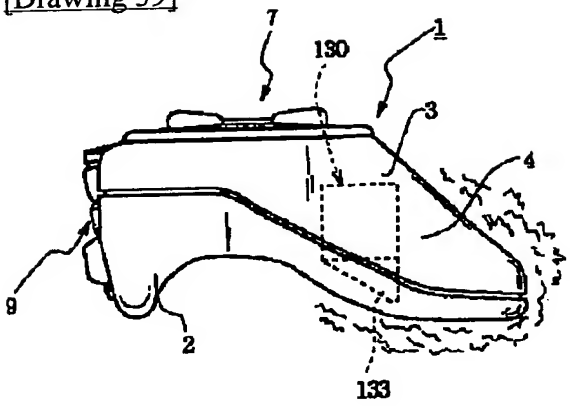


図３９　振動部材の振動による操作装置の振動

[Drawing 46]

	1バイト目	2バイト目	3バイト目	4バイト目	5バイト目
ゲーム機本体からの受信データ	0x01	0x42	—	データ(TXD1)	データ(TXD2)
ゲーム機本体への送信データ	—	0x42	0x5a	データ(RXD1)	データ(RXD2)

図４６　シリアル通信データ

[Drawing 38]

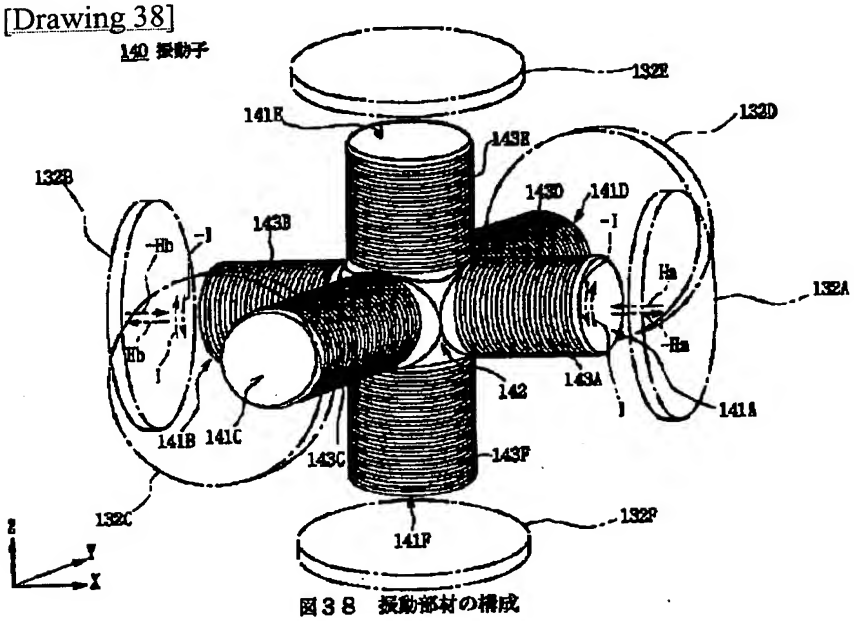


図３８　振動部材の構成

[Drawing 40]

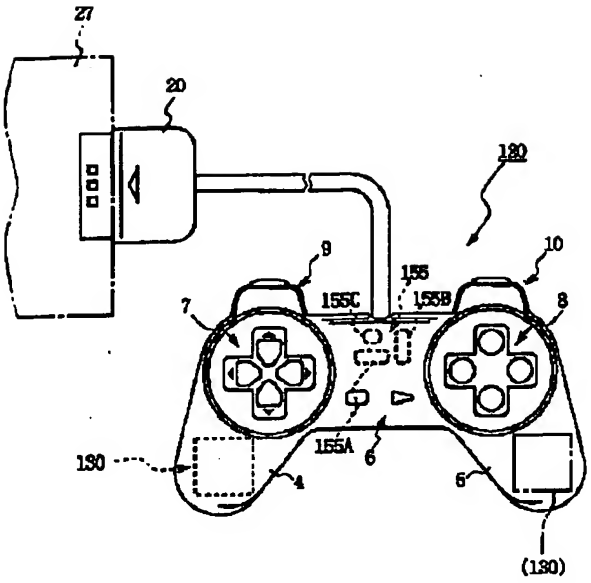


図４０　応答手段の配置

[Drawing 41]

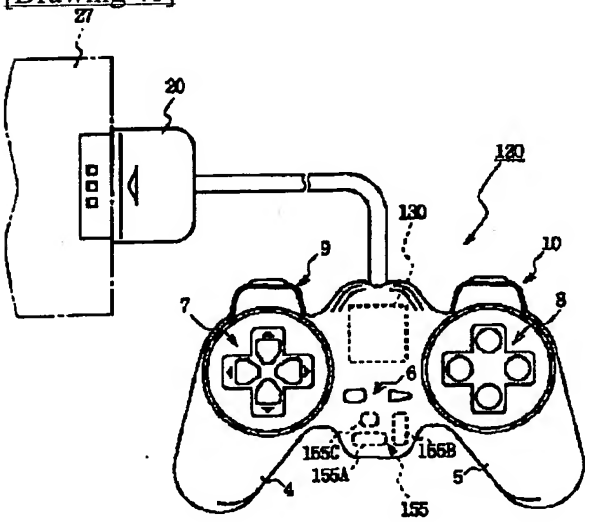


図４１　応答手段の配置

[Drawing 42]

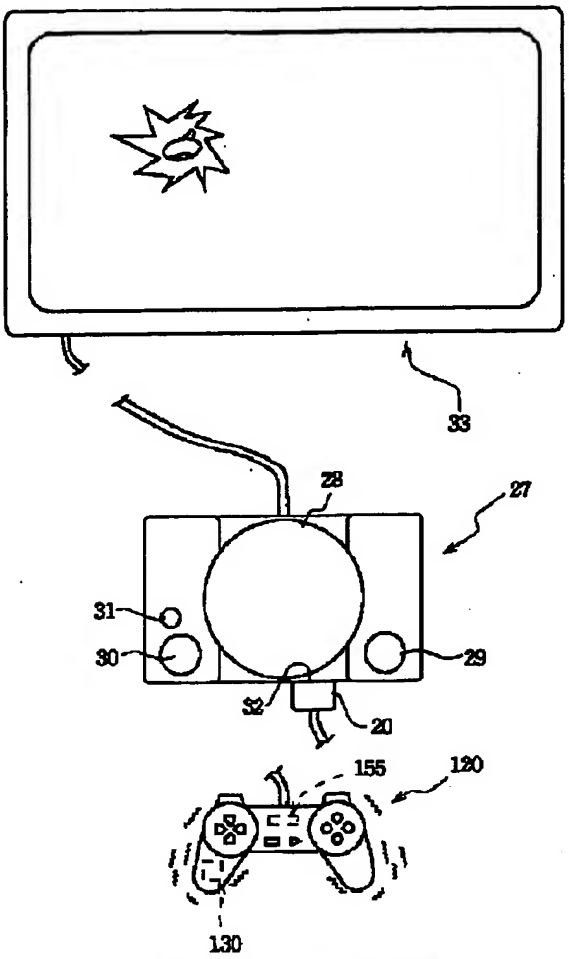


図４２　ゲーム機の操作状態

[Drawing 43]

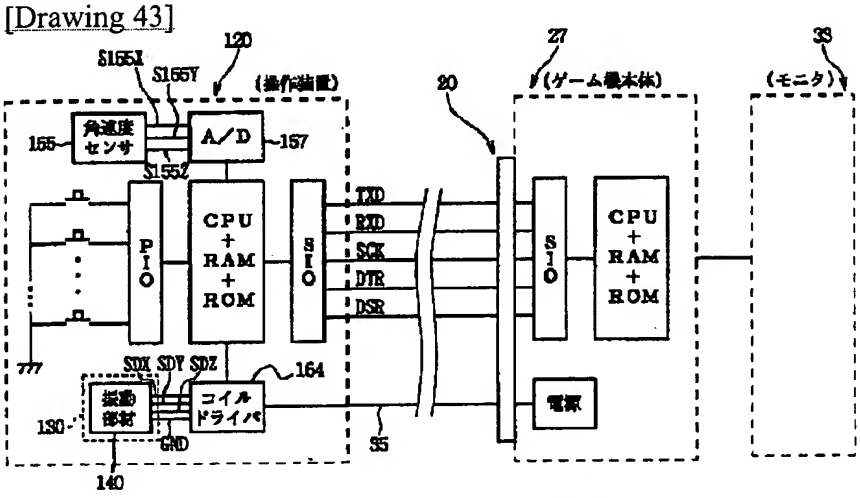


図４３　ゲーム機本体及び操作装置の接続

[Drawing 44]

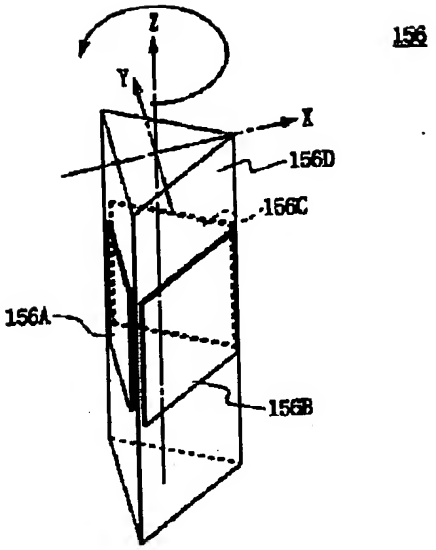


図４４　角速度センサの構成

[Drawing 45]

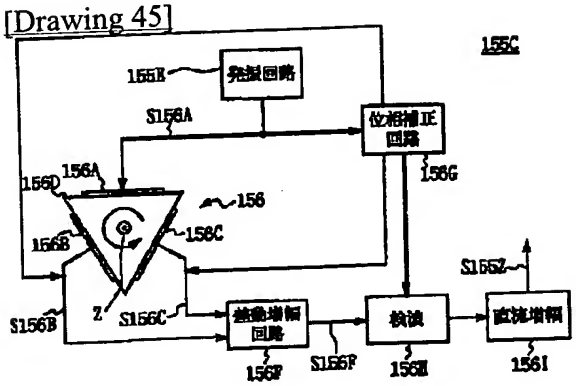


図４５　Ｚ軸角速度センサ部

[Drawing 47]

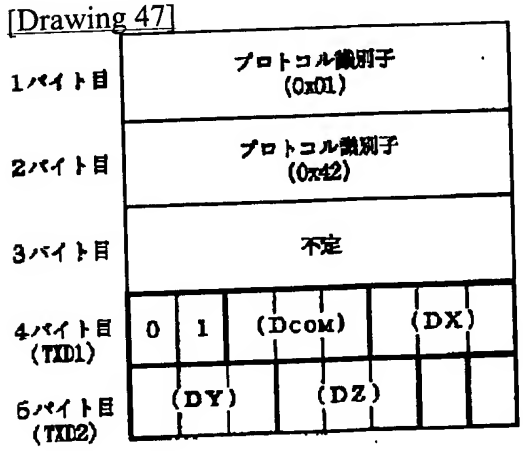


図４７　シリアル通信データ

[Drawing 48]

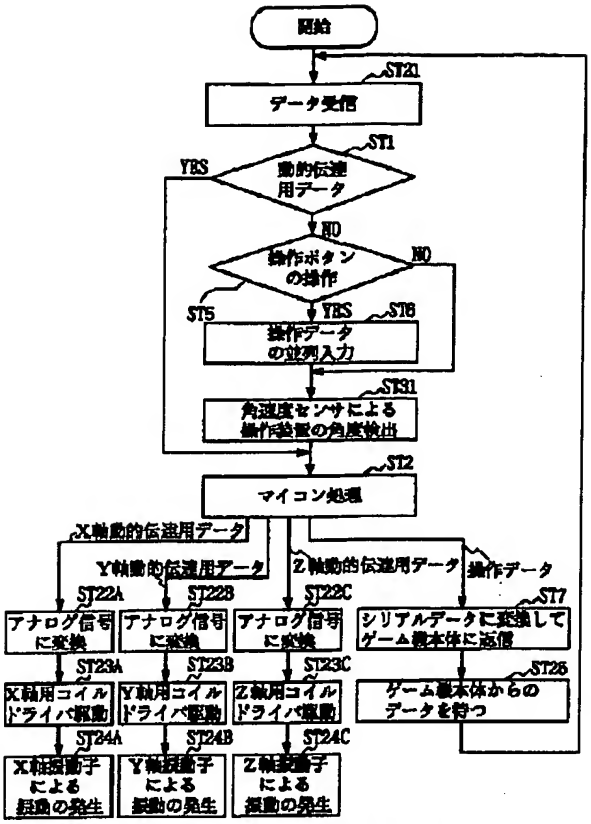


図４８　操作装置側の処理手順

[Drawing 49]

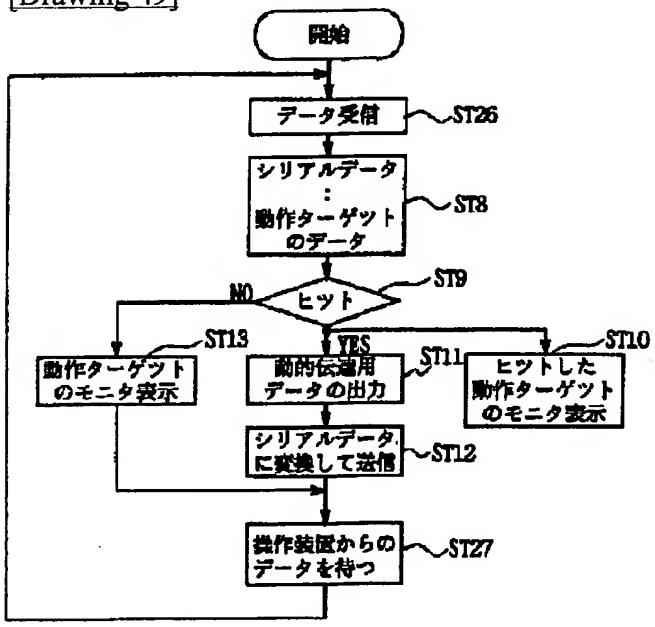


図４９　ゲーム機体側の処理手順

[Drawing 50]

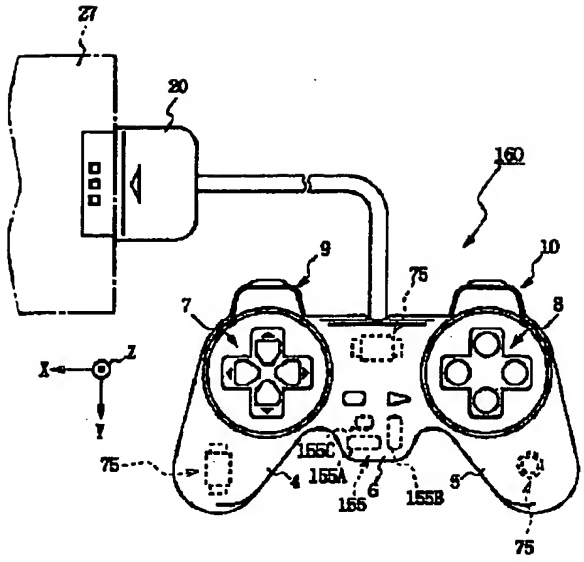


図５０　独立した応答手段の配置例

[Drawing 51]

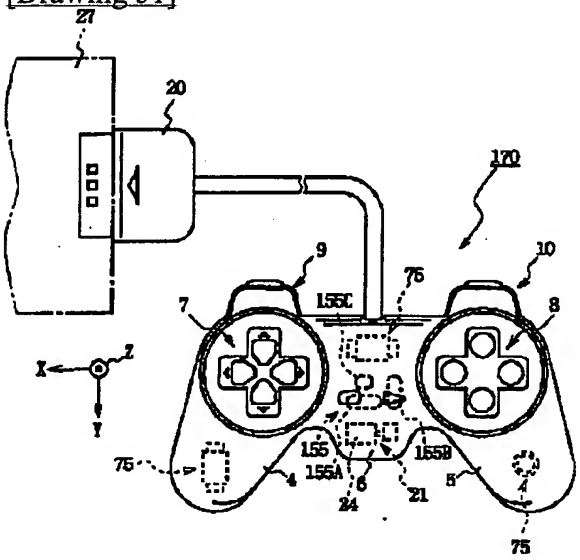


図５１　ボイスコイル及びモータの併用（１）

[Drawing 52]

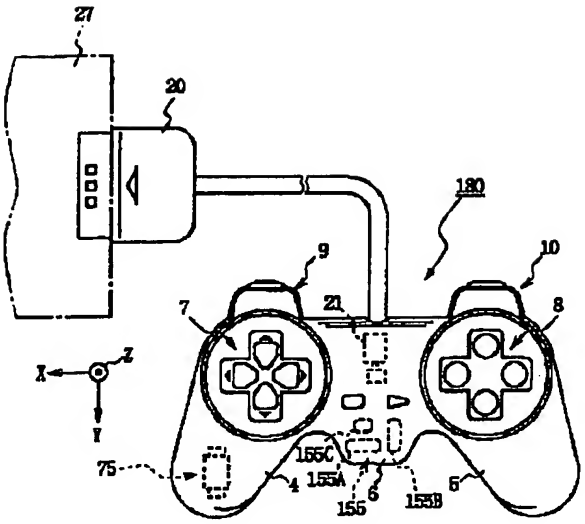


図５２　ボイスコイル及びモータの併用（２）

[Drawing 53]

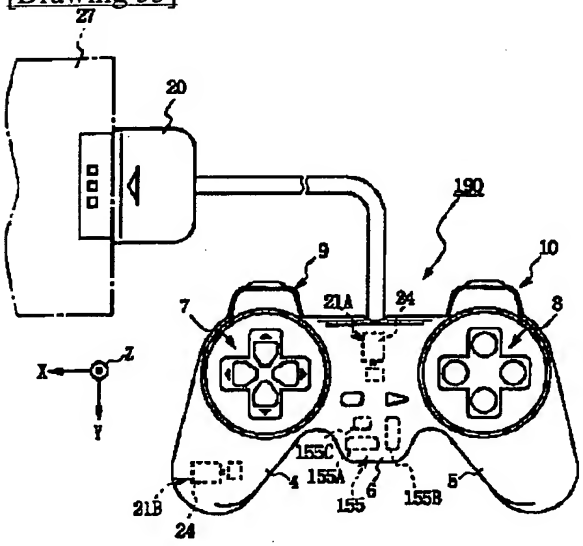


図５３　モータを用いた複数の応答手段の配置

[Drawing 54]

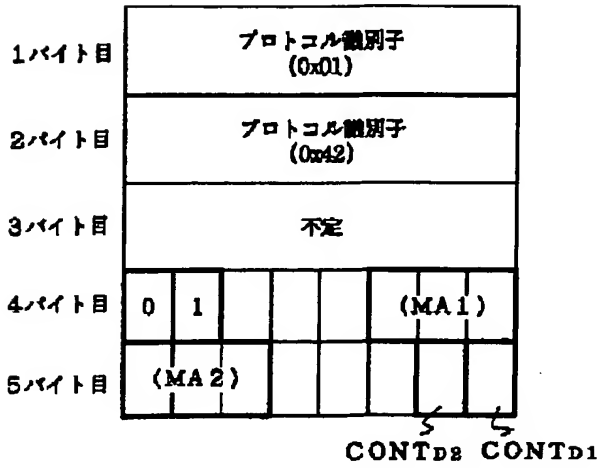


図54　シリアル通信データ

[Drawing 55]

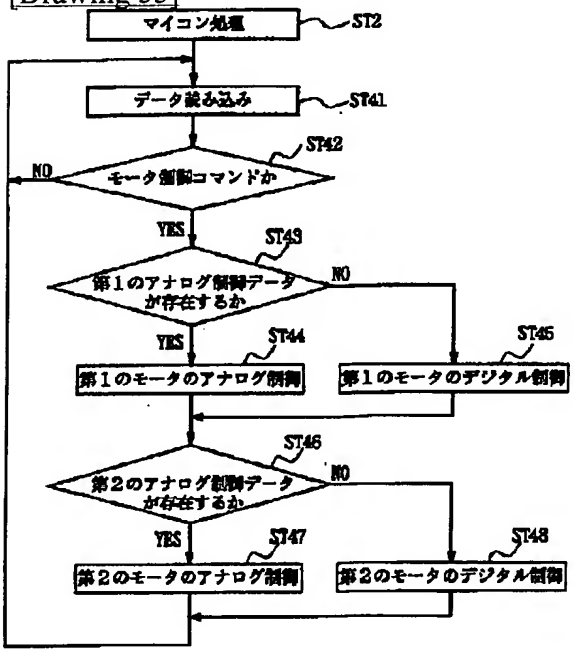


図56　ゲーム機用操作装置のマイコン処理

[Drawing 56]

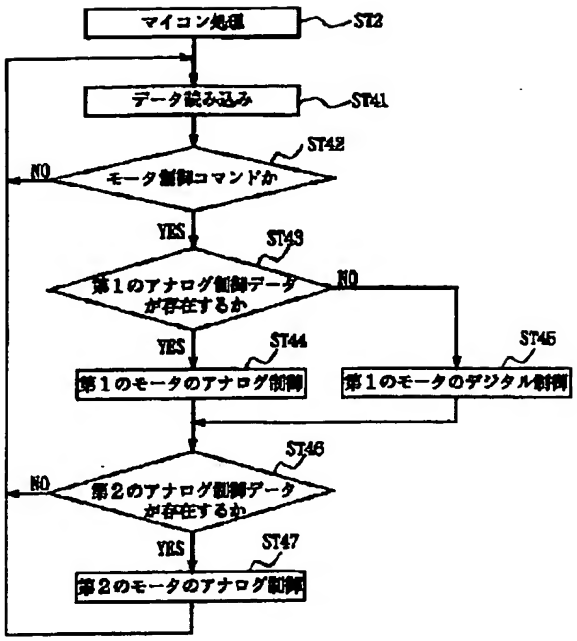


図56 マイコン処理の他の実施の形態

[Drawing 57]

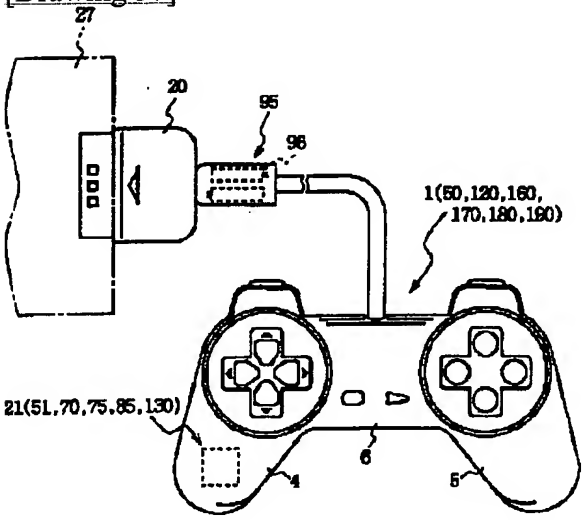


図57 応答手段用電源部の他の実施の形態

[Drawing 58]

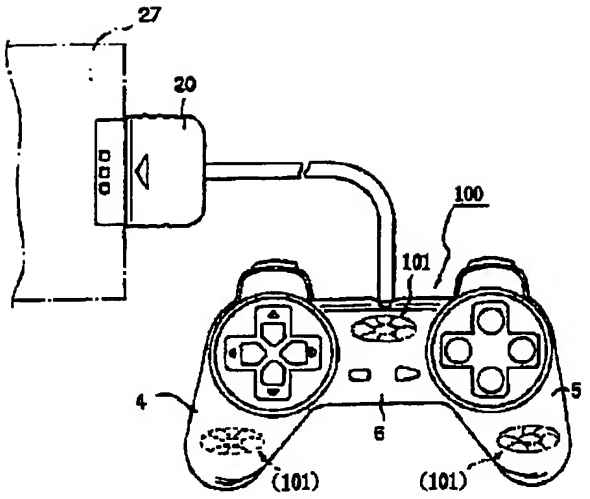


図５８　他の実施の形態による音声発生部を有する操作装置

[Drawing 59]

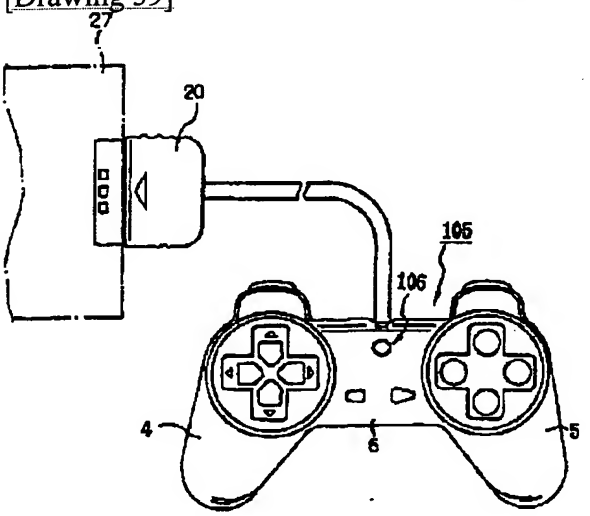


図５９　他の実施の形態による発光部を有する操作装置

[Drawing 60]

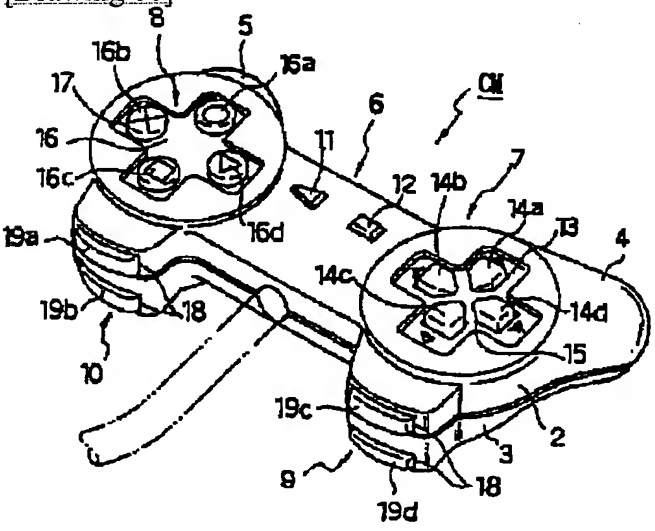


図６０　従来例

[Translation done.]

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(74)代理人　100089004
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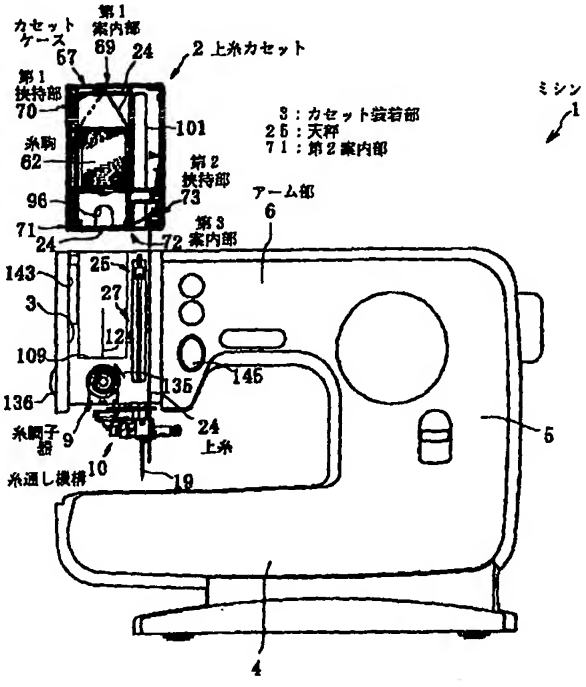
FA06 FC03 FJ01 FJ04 GD22
JA07 JA17 QA06

(54)【発明の名称】　ミシン

(57)【要約】
【課題】針の針穴に上糸を糸通しする自動糸通し機構は手動操作式のレバーを操作して作動させる構成であるため、その他の機構と連動して糸通しするのに適しておらず、上糸カセットの装着時に天秤の糸掛け部や糸調子器への糸掛けと連動して糸通しすることはできない。
【解決手段】ミシンのアーム頭部に天秤移動領域を含むカセット装着部３を縦溝状に形成し、このカセット装着部３に糸駒６２を縦向きに収容した上糸カセット２を着脱可能に構成し、アーム頭部に糸通し機構１０を設け、上糸カセット２の装着動作に連動させて天秤２５の糸掛け部と糸調子器９に糸掛けするとともに、糸通し機構１０により針穴１９ａに糸通しする。



【特許請求の範囲】
【請求項１】　針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたミシンにおいて、
ミシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、
前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするミシン。
【請求項２】　前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とする請求項１に記載のミシン。
【請求項３】　前記ミシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作体装着部を形成したことを特徴とする請求項１又は２に記載のミシン。
【請求項４】　前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とする請求項１～３の何れかに記載のミシン。
【請求項５】　前記ミシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とする請求項４に記載のミシン。
【請求項６】　前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項５に記載のミシン。
【請求項７】　前記カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とする請求項６に記載のミシン。
【請求項８】　前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とする請求項５～８の何れかに記載のミシン。
【請求項９】　前記可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とする請求項１～８の何れかに記載のミシン。
【請求項１０】　少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とする請求項１～９の何れかに記載のミシン。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】　本発明は、アーム部に少なくとも所定範囲内で移動可能な可動操作体を備えたミシンに関するものである。
【０００２】
【従来の技術】　通常のミシンにおいては、アーム部内に主軸で駆動される天秤機構や針棒駆動機構が配設され、天秤はアーム頭部の縦スリットから部分的に突出し上下に往復駆動される。アーム部の上端側に糸駒装着部が設けられ、アーム部の前面側に糸調子器と糸調子バネが配設され、この糸調子器の付近に糸調子器の調節ダイヤルが設けられている。針棒はアーム頭部の下方へ突出して、この針棒の下端部に針が取付けられ、縫製対象の生地を押える押え足とこの押え足を支持する押え棒は、押え上げレバーにより生地を押える下降位置と上方へ退避させた退避位置とに切換え可能である。
【０００３】縫製を停止して上糸の糸駒を交換する場合、押え足は退避位置にあり、糸調子器が開放状態になっている。その状態で糸駒を交換し、この糸駒から繰り出した上糸を複数の糸案内部を経て糸調子器に導き、開放状態の１対の糸調子皿の間と糸調子バネとに糸掛けし、天秤の糸掛け部に糸掛けし、その後針の針穴に上糸の端部を糸通しする。このように、上糸の糸駒を交換する際には糸調子器、糸調子バネ、天秤の糸掛け部に糸掛けを行い、針穴に糸通しを行なう必要がある。
【０００４】そこで、米国特許第3,749,039 号公報には、上糸カセットをアーム部に着脱可能に構成し、糸掛けを簡単に行えるようにした技術が記載されている。このミシンのアーム部の左右方向ほぼ中央部にはカセット装着部が設けられ、このカセット装着部に上方から上糸カセットを着脱可能になっている。前記カセット装着部は、天秤機構の天秤が上下に往復移動する天秤移動空間の右側に形成され、天秤の先端側部分はカセット装着部の左端部に突入して上下に往復移動する。
【０００５】前記上糸カセットは、正面視ほぼ台形をなすカセットケースを有し、このカセットケースはケース本体と開閉蓋からなる。カセットケース内の上部の糸駒収容部には糸駒がその軸心を水平にして収容され、この糸駒の上糸は右方へ所定長さほぼ水平に繰り出される。カセットケースの中央部の下部には糸調子器を突入させ

る為の第１切欠き部が形成され、カセットケースの左端部の下部には天秤を導入する為の第２切欠き部が形成されている。

【０００６】糸駒から繰り出された上糸を案内する５つの糸案内が設けられている。第１糸案内はカセットの右端部の上部に設けられ、第２，第３糸案内は第１切欠き部を挟む位置に設けられ、第４，第５糸案内は第２切欠き部を挟む位置に設けられている。第１糸案内には、上糸カセットをカセット装着部に装着しない状態で上糸に抵抗を付与し且つカセット装着後には開放する第１抵抗付与部が設けられている。第５糸案内には、カセット未装着の状態で上糸に抵抗を付与し且つカセット装着後には開放する第２抵抗付与部が設けられている。この第２抵抗付与部では第１抵抗付与部よりも強い抵抗を付与するようになっている。

【０００７】アーム部に設けたカセット装着部の左端部分には、上糸カセットを装着する際に上糸を案内して天秤の糸掛け部に案内する糸案内部材が設けられている。この糸案内部材は左右１対のアーム板とウェブとを一体形成したもので、１対のアーム板の後端には上糸を案内する案内面が形成され、これらアーム板には天秤の糸掛け部に対応するノッチ（切欠き部）が形成されている。また、上糸カセットとカセット装着部には、上糸カセットの装着時に糸調子器の１対の糸調子皿を開いた状態にし、上糸カセットの装着完了後に１対の糸調子皿を閉じるようにする機構も設けられている。

【０００８】上糸カセットをカセット装着部に装着する場合には、最初に、手動操作で主軸を回転させて天秤を最下位置に移動させる。次に、上糸カセットを上方からカセット装着部に装着していくと、上糸が糸案内部材で案内されつつ下降し、第２，第３糸案内の間の上糸が糸調子器と糸調子バネに自動的に糸掛けされ、第４，第５糸案内の間の上糸が糸案内部材の案内面で案内されて天秤の糸掛け部に自動的に糸掛けされ、上糸カセットが装着完了状態になると、第１，第２抵抗付与部が開放状態になり、その後の縫製中には糸駒から上糸が繰り出される。

【０００９】一方、特開昭５５－８１６９３号公報には、ミシンのカセット式通糸装置が提案されている。このカセット式通糸装置では、アーム部の天秤移動領域とその右側領域に設けたカセット装着部と、このカセット装着部を開閉するカバー体を設け、このカバー体に上糸カセットを着脱する。カセット装着部には糸調子器と糸取りバネとが突出し、カセット装着部の左端部には天秤移動空間がある。

【００１０】上糸カセットは、糸巻体収容部と、１対の脚部などを有し、糸巻体の中心から繰り出した上糸を１対の脚部の間に延ばして自由スパンを形成する。カバー体を前方へ９０度回動させて開き、このカバー体に上糸カセットをセットしてから、カバー体を閉じる。天秤を最下位置にしてカバー体を閉じる閉動作の際、上糸カセットの自由スパンが糸調子器と糸取りバネに自動的に糸掛けされる。その後、天秤を上昇させると、天秤の糸掛け部に自動的に上糸が掛けられる。尚、前記カバー体を閉じた状態では、糸巻の軸心は水平方向且つ前後方向に向いている。

【００１１】他方、例えば特開平５－２９３２８４号公報に示すように、ミシンのアーム頭部に自動糸通し機構を装備し、その操作レバーを所定距離下方へ移動させることで、針の針穴に上糸の糸端を糸通しするように構成したミシンも実用に供されている。但し、この自動糸通し機構は他の機構や装置と連動する構成ではない。

【００１２】

【発明が解決しようとする課題】　前記米国特許公報に記載の上糸カセットを用い、この上糸カセットをカセット装着部に装着しながら、天秤の糸掛け部と糸調子器の１対の糸調子皿及び糸調子バネとに自動的に糸掛けすることができる。しかし、前記公報のミシンでは、自動糸通し機構を装備していないから、上糸カセットの装着と連動して、針穴に上糸の糸端を糸通しすることができない。そのため、天秤の糸掛け部と糸調子器に糸掛けした後、手動操作より針穴に上糸の糸端を糸通しする必要があり、上糸交換の作業能率を高めることが難しい。

【００１３】しかも、前記公報のミシンでは、上糸カセットの装着の際、予めミシンの主軸を手動操作することで天秤を最下位置を切換えてから、上糸カセットをカセット装着部に装着するような構成となっているため、天秤を最下位置を切換える操作が煩わしく、作業能率を高めにくい。

【００１４】本発明の目的は、可動操作体の移動に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着動作に連動して天秤の糸掛け部に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、上糸カセットの装着操作に連動して天秤の糸掛け部と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しすることのできるミシンを提供すること、などである。

【００１５】

【課題を解決するための手段】　請求項１のミシンは、針の運動に調時して往復運動することにより糸駒から繰り出された上糸を取り上げる天秤と、針穴に上糸を通す自動糸通し機構とを備えたミシンにおいて、ミシンのアーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、前記可動操作体を前記所定範囲内で移動させることにより、上糸を操作して天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。

【００１６】可動操作体は、上糸の糸駒を収容した上糸カセットであってもよく、糸駒を収容していない操作具であって上糸カセットと同様に糸掛けする為の操作具であってもよく、或いは、アーム部に所定角度揺動可能に枢着された揺動レバーであって上糸カセットと同様に糸掛けする為の揺動レバーであってもよい。

【００１７】可動操作体は、ミシンのアーム部に少なくとも所定範囲内で移動可能に設けられ、この可動操作体を前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、自動糸通し機構を作動させて上糸を針穴に糸通しする。このように、可動操作体の移動の動作に連動させて、天秤の糸掛け部に糸掛けしつつ、上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛けと、針穴への糸通しが簡単化し、作業能率を高めることができる。

【００１８】請求項２のミシンは、請求項１の発明において、前記可動操作体は、上糸を天秤の糸掛け部に糸掛けする際にその上糸を操作する上糸操作部と、上糸を針穴に糸通しする際に前記自動糸通し機構を作動させる糸通し作動部を備えたことを特徴とするものである。可動操作体を装着しながら、上糸を天秤の糸掛け部に糸掛けする際に可動操作体の上糸操作部が上糸を操作し、上糸を針穴に糸通しする際に可動操作体の糸通し作動部が自動糸通し機構を作動させる。

【００１９】請求項３のミシンは、請求項１又は２のミシンにおいて、前記ミシンのアーム部の前部又は前面部に、前記可動操作体を着脱可能に装着する為の操作装着部を形成したことを特徴とするものである。前記操作体装着部がアーム部の前部又は前面部に形成されているため、可動操作体の着脱操作が行い易くなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。

【００２０】請求項４のミシンは、請求項１～３の何れかの発明において、前記可動操作体は、糸駒を収容しかつその糸駒から繰り出された上糸を天秤側に供給する上糸カセットであることを特徴とするものである。この上糸カセットは、前記アーム部に対して着脱可能なものであり、この上糸カセットには糸駒が収容され、糸駒からの上糸を天秤側へ供給するため、上糸カセットの装着側への操作により天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸を交換できる。

【００２１】請求項５のミシンは、請求項４の発明において、前記ミシンのアーム部の前面部に、前記操作装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したことを特徴とするものである。

【００２２】操作装着部としてのカセット装着部が、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状に形成されているため、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。

【００２３】請求項６のミシンは、請求項５の発明において、前記カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設けると共に、カセット装着部の他の一部に突出する糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするため、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。

【００２４】請求項７のミシンは、請求項６の発明において、前記カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、前記上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したことを特徴とするものである。従って、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けでき、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができる。

【００２５】請求項８のミシンは、請求項５～８の何れかの発明において、前記上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したことを特徴とするものである。上糸カセットをカセット装着部に途中の位置まで装着すれば、上糸カセットから手を離し得る状態になるため、自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させる。

【００２６】請求項９のミシンは、請求項１～８の何れかの発明において、前記可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられていることを特徴とするものである。そのため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。

【００２７】請求項１０のミシンは、請求項１～９の何

れかの発明において、少なくとも針棒の作動位置を検出する検出手段を有し、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、前記可動操作体を移動可能に構成したことを特徴とするものである。針棒が所定位置にある場合には、針穴の高さ位置が一定の高さ位置にあるから、可動操作体を装着して自動糸通し機構を作動させて糸通しするのに適していることに鑑み、針棒が所定位置にある場合に可動操作体を操作体装着部に装着可能にしてある。

【００２８】

【発明の実施の形態】　以下、本発明の実施の形態について図面を参照して説明する。この電子制御式ミシンは、アーム頭部のカセット装置部に糸駒を収容した上糸カセットを装着可能に構成し、その上糸カセット２を装着する際の装着動作と連動して、天秤の糸掛け部と糸調子器に糸掛けを行なうと共に針の針穴に糸通しを行うように構成したものである。

【００２９】最初に、ミシン１の基本構造、糸通し機構１０について順に説明し、その後上糸カセット２、カセット装着部３、天秤機構８、糸通しの為の伝達機構115、糸調子器９の為の連動機構134 の順に説明する。尚、以下の説明は、ミシンを操作する者から視た前後左右を前後左右として説明する。

【００３０】図１～図３に示すように、この電子制御式ミシン１は、ベッド部４と、ベッド部４の右端部に立設された脚柱部５と、脚柱部５の上端から左方に延びるアーム部６を有する。アーム部６には、針棒上下動機構７、カセット装着部３、天秤機構８、糸調子器９、自動糸通し機構１０が設けられている。尚、カセット装着部３はアーム部６の頭部（アーム頭部）に設けられている。アーム部６内には、主軸１１が１対の軸受１２を介して回転可能に支持され、主軸１１は図示外のミシンモータの駆動力で回動駆動される。

【００３１】次に、針棒上下動機構７について説明するが、この機構は一般的な構造ものであるので簡単に説明する。図１、図３～図８に示すように、アーム部６のアーム頭部には、針棒台フレーム１３が立向きに配設され、針棒台フレーム１３は後壁部１４と左壁部１５とを有し、後壁部１４の下端と上端には前方へ延びる下支持部１４ａと上支持部１４ｂが夫々一体形成されている。左壁部１５の上端部には、上支持部１４ｂよりも上方に延びる枢支腕部１５ａが形成され、針棒１８は上支持部１４ｂと下支持部１４ａを上下動可能に挿通している。

【００３２】枢支腕部１５ａの上端部には、左右方向向きの軸部材１６ａが固着され、前面開放状の平面視略コ字形状の枢支金具１６が軸部材１６ａに固定的に連結され、枢支金具１６は前後方向向きの水平な支持軸１７を介してミシン機枠に揺動可能に支持され、針棒台フレーム１３は支持軸１７を揺動中心として左右方向（針振り方向）へ揺動可能である。尚、ステッピングモータにより針棒台フレーム１３を介して針を揺動駆動する機構は一般的なものであるのでその説明は省略する。針棒１８は上支持部１４ｂと下支持部１４ａに上下動可能に支持され、針棒１８の下端には針１９が着脱可能に取付けられている。

【００３３】図３、図１１～図１３に示すように、主軸１１の左端側部分には、天秤機構８の天秤クランク２０が設けられ、その天秤クランク２０にクランクピン２１を介して針棒クランク２２が回動自在に連結されている。針棒１８の略中段部には針棒抱き２３が固定され、針棒クランク２２が針棒抱き２３に連結されている。縫製の際、ミシンモータにより主軸１１が回転駆動され、針棒クランク２２により針棒１８が上下に往復駆動される。

【００３４】図１１～図１５、図１７に示すように、アーム部６には、針１９の上下運動に調時して上糸２４を取り上げる天秤２５を備えた天秤機構８が設けられている。天秤２５の先端部に上方から糸掛け可能な糸掛け部２６が形成され、カセット装着部３の右端側部分の全高に亙って、天秤２５の糸掛け部２６が上下に往復移動可能な天秤移動領域２７が設けられている。カセット装着部３の下部に突出するように、上糸に通過抵抗を付与する為の糸調子器９が設けられている。

【００３５】この糸調子器９は、押え足２８を昇降させる押え上げレバー２９により開閉操作可能であり、後述するように、上糸カセット２の装着時にも、糸調子器９が開閉操作される。尚、脚柱部５内にはほぼ立て向きの縦軸が配設され、その縦軸はギヤ機構を介して主軸１１に連動連結され、この縦軸の駆動力がベッド部４内の糸捕捉用釜に伝達される。一般的な電子制御ミシンと同様に、針１９と糸捕捉用釜とステッピングモータで駆動される布送り機構との協働により加工布３０に縫製が施される。

【００３６】次に、針１９の針穴１９ａに上糸２４を糸通しする自動糸通し機構１０について、図５～図１０、図１４、図１５、図１７、図１９を参照して説明する。針棒台フレーム１３の上支持部１４ｂと下支持部１４ａには、針棒１８の左側に位置する糸通し軸３１とスライダーガイド軸３２とが上下動可能に支持されている。糸通し軸３１の上端部は、ブラケット１６と軸部材１６ａの間の隙間に挿通しており、糸通し軸３１の略中段部には、水平方向に突出する摺動ピン３３が固着されている。

【００３７】糸通し軸３１の下端部には、合成樹脂製のフック保持部材３４が固着され、フック保持部材３４の上側と下側に対応する糸通し軸３１に、側面視略コ字形状の第１糸案内部材３５（図１７参照）の上支持部，下支持部が回動可能に支持されている。この第１糸案内部材３５のうち、上支持部と下支持部とを連結する鉛直状の連結壁３６には、上糸２４を係合して案内する糸ガイ

ド３６ａが切欠き状に形成されている。

【００３８】図９（ａ）～（ｃ）に示すように、フック保持部材３４にはフック機構３７が固定され、このフック機構３７は、糸通しフック３７ａと、糸通しフック３７ａの両側に位置する２枚のガイド部材３７ｂと、これら糸通しフック３７ａとガイド部材３７ｂを水平に貫通する糸保持ワイヤ３７ｃなどから構成されている。糸通しフック３７ａの先端部にはフック部が形成され、糸通しの際針穴１９ａにこのフック部が挿通し、針１９が前記ガイド部材３７ｂにより案内されつつ針穴１９ａの直前に位置する上糸２４を引っ掛けるようになっている。

【００３９】フック保持部材３４には、第２糸案内部材３８が一体的に固着され、この第２糸案内部材３８の略先端近傍部が下方に屈曲形成され、その屈曲部が糸案内部３８ａとして機能している。糸案内部３８ａは、糸通し軸３１に対しフック機構３７と略反対側に位置し且つ所定距離だけ離隔している。即ち、この第２糸案内部材３８とフック機構３７とが一定の位置関係を保持して糸通し軸３１に一体的に設けられている。

【００４０】次に、糸通し軸３１を所定角度だけ回動させる回動機構について説明する。図５～図８、図１４、図１５、図１７、図１９に示すように、針棒台フレーム１３の背面側において糸通し軸３１とスライダーガイド軸３２の上端部には、合成樹脂製の糸通しスライダ４０が上下動可能に外嵌されている。即ち、糸通しスライダ４０は、上枢支部４１及び下枢支部４２と、外周壁部４３と、糸通しスライダ爪４４とを有する。

【００４１】上枢支部４１及び下枢支部４２は、糸通し軸３１とスライダーガイド軸３２とにわたって設けられ、外周壁部４３は、これら上枢支部４１と下枢支部４２とを鉛直状に連結し且つ糸通し軸３１の前記上端部の外周の略半分を覆うように形成されている。この外周壁部４３には螺旋状の糸通しスライダカム部４３ａが形成されている。上枢支部４１と下枢支部４２の左端部には、糸通しスライダ爪４４が連結され、その左端略中段部分に爪部４４ａが形成されている。

【００４２】糸通し軸３１の略中段部のうち、下枢支部４２の直ぐ上側に対応する位置には、所定長さの摺動ピン３３が貫通状に固定され、この摺動ピン３３の奥側端部が糸通しスライダカム部４３ａに係合している。糸通し軸３１のうち摺動ピン３３よりも一定長さ下側には、バネ受けピン４５が貫通状に固定され、糸通し軸３１のうち下枢支部４２とバネ受けピン４５との間には、圧縮コイルバネ４６が外装されている。スライダーガイド軸３２のうち下枢支部４２と、針棒台フレーム１３の下支持部１４ａとの間には、糸通しスライダ４０を上方へ付勢する為の圧縮コイルバネ４７が外装されている。

【００４３】ここで、オフセット部材４８について説明すると、図４～図８に示すように、糸通し軸３１とスライダーガイド軸３２には、糸通しスライダ４０の背面側で且つ針棒台フレーム１３の上支持部１４ｂ、下支持部１４ａ間の高さの約３／４長さ範囲において、オフセット部材４８が上下動可能に装着されている。このオフセット部材４８は、上支持部４９と、下支持部５０と、これら上支持部４９と下支持部５０とを連結する鉛直状の連結壁５１等から構成されている。上支持部４９は、糸通し軸３１とスライダーガイド軸３２とに挿通され、下支持部５０は糸通し軸３１のみに挿通されている。

【００４４】針棒１８の針棒抱き２３の直ぐ上方には、係合片としての糸通し位置決め部材５２が固定され、オフセット部材４８の上支持部４９の右端部分が、この糸通し位置決め部材５２に上方から当接可能に構成されている。この上支持部４９の右端部分が糸通し位置決め部材５２に当接した状態で、糸通しフックが針１９の針穴１９ａの高さ位置に合致するようになっている（図６参照）。連結壁５１の左端下部には、オフセット部材カム部５３が形成され、このオフセット部材カム部５３は、下方に向かう程左側に突出する傾斜部５３ａと、この傾斜部５３ａの下端から鉛直下方に延びる平坦部５３ｂであって、糸通しスライダ爪４４の爪部４４ａよりもやや左方に突出する平坦部５３ｂとを有する。

【００４５】後述する上糸カセット２により糸通しスライダ４０を、圧縮コイルバネ４７の付勢力に抗して図５に示す上限位置から下方に押下げると、糸通し軸３１とスライダーガイド軸３２とオフセット部材４８が追従して下降し、オフセット部材４８の上支持部４９が糸通し位置決め部材５２に当接した状態で停止する（図６参照）。このとき、糸通し軸３１とスライダーガイド軸３２に対して糸通しスライダ４０が相対的に下降するので、摺動ピン３３が螺旋状の糸通しスライダカム部４３ａに沿って移動する。糸通し軸３１が平面視にて時計回り方向に所定角度だけ回動して糸通しされる（図９（ａ）～（ｃ）参照）。

【００４６】この糸通しのとき、フック機構３７が針１９に接近する方向に回動され、前記糸通しフックが針穴１９ａに挿通する。同時に、第２糸案内部材３８がフック機構３７と同期して時計回り方向（針１９から遠ざかる方向）に回動される。糸通しに際して、糸通し軸３１の下端部に回動可能に支持された第１糸案内部材３５を第２糸案内部材３８から離隔する方向に回動させるリンク機構５４も設けられている。即ち、糸通し軸３１が糸通しの為に回動する前の待機状態のときには、第２糸案内部材３５が前方向きの姿勢であり、第２糸案内部材３８の糸案内部３８ａは、連結壁３６の糸ガイド３６ａの直ぐ内側に位置している。

【００４７】糸通し軸３１が下限位置まで下降した後に回動するときには、フック機構３７と第２糸案内部材３８とが平面視にて時計回り方向に一体的に回動すると共に、リンク機構５４を介して第１糸案内部材３５が反時計回り方向に回動する。つまり、第１糸案内部材３５

は、第２糸案内部材３８から離隔移動し且つフック機構３７に接近移動するようになっている。尚、リンク機構５４付近部には、上糸２４を微圧挟持する支持板５５、糸案内皿５６も設けられている。

【００４８】次に、上糸カセット２について説明する。図１、図１０、図１４～図３６に示すように、可動操作体としての上糸カセット２は、左右方向幅が小さな縦長の直方体に近い形状のカセットケース５７と、糸駒６２を収容する糸駒収容部５７ａと、糸駒収容部５７ａ内に糸駒６２を保持する糸駒保持部５８と、糸駒保持部５８に保持された糸駒６２と、糸駒６２から繰り出される上糸２４を糸出口６８まで案内する糸経路５９と、天秤機構８の天秤２５の糸掛け部２６が上下に往復移動する領域である天秤移動領域５７ｂと、糸調子器９を突入させる糸調子器収容部５７ｃ等を有する。尚、カセットケース５７の底壁のうちの右端近傍部に糸出口６８が形成されている。

【００４９】カセットケース５７は、合成樹脂製のカセット本体６０と開閉蓋６１とを有し、カセット本体６０の右端部に開閉蓋６１が開閉可能に連結されている。但し、開閉蓋６１はカセット本体６０に対して上下にスライドさせて開閉するように構成してもよい。糸駒６２の上糸２４の糸色を識別する糸色識別手段として、開閉蓋６１は透明な材料で構成され、カセットケース５７内の糸駒６２の糸色を識別可能となっている。尚、別の糸色識別手段として、例えば、開閉蓋６１に糸駒６２を視る為の開口穴を形成してもよく、或いは、カセットケース５７の表面の一部に糸駒６２の上糸２４の色と同色のシールを貼ってもよい。

【００５０】図１０、図１６、図２８～図３３に示すように、天秤移動領域５７ｂはカセットケース５７内の右側の約１／３幅部分に形成され、糸駒収容部５７ａはカセットケース５７内の左側の約２／３幅部分のうちの上部約２／３部分に形成され、糸調子器収容部５７ｃはカセットケース５７内の左側の約２／３幅部分のうちの下部約１／３部分に形成され、カセット本体６０内の左端部には糸経路５９の為の領域が仕切壁６６，９９で仕切られている。

【００５１】天秤移動領域５７ｂにおいてカセット本体６０の後壁には天秤２５の糸掛け部２６と後述の糸案内部材106Aを突入させる為の縦長のスリット１０１が形成されている。糸調子器収容部５７ｃにおいてカセット本体６０の後壁と底壁には、糸調子器収容部５７ｃに糸調子器９を導入する為の切欠き部９６が形成されている。天秤移動領域５７ｂと糸駒収容部５７ａ及び糸調子器収容部５７ｃの間には鉛直の仕切壁６７，１００が形成され、糸駒収容部５７ｃと糸調子器収容部５７ａの間には開閉蓋６１側へ突出する水平な支持壁６３が形成されている。

【００５２】糸駒保持部５８は、糸駒６２をその軸心を鉛直向きに保持するように構成されているため、カセットケース５７の左右方向の幅を小さくし、カセットケース５７及びカセット装着部３の小型化を図ることができる。糸駒保持部５８は、支持壁６３（収容部の壁部に相当する）と糸駒保持軸６４とで構成されている。この支持壁６３には糸駒保持軸６４が上方に突出するように設けられている。この糸駒保持軸６４は、周方向に３つ割りに形成されて拡径方向に弾性変形可能であり、種々のサイズの軸穴を有する糸駒６２を保持可能になっている。

【００５３】支持壁６３のうち、糸駒６２の下端（軸心方向の一端）と当接する部分の前端部には、糸駒６２を下方から押して糸駒保持軸６４から上方へ取り外す為の凹部６５が形成されている。この凹部６５は、糸駒６２の外周面よりも半径方向内側に窪んだ切欠き状に形成され、上糸２４が弛んでも糸駒６２と支持壁６３の間に上糸２４が入り込まないようになっている。

【００５４】次に、糸経路５９について説明する。図１４、図１５、図１７～図２１に示すように、糸経路５９は、糸駒保持部５８に保持した糸駒６２からの繰り出し点７９を基点とし、糸駒６２から上方へ繰り出した上糸２４をカセットケース５７の糸出口６８に導く上糸案内経路である。糸経路５９は、第１案内部６９と、第１挟持部７０と、第２案内部７１と、第３案内部７２と、第２挟持部７３とを有する。糸駒６２を糸駒保持部５８に保持した状態で、糸駒６２から上方へ繰り出された上糸２４は、第１案内部６９、第１挟持部７０、第２案内部７１、第３案内部７２、第２挟持部７３を順に経由してカセットケース５７の右端近傍の下端部の糸出口６８に導かれる。

【００５５】図１７、図１９、図２２～図２５に示すように、第１案内部６９と第１挟持部７０は、糸経路５９の上流側部分に設けられている。第１案内部６９は、カセットケース５７の頂部に設けられている。第１案内部６９は、カセット本体６０に形成されたピン支持部材７４と、このピン支持部材７４から前方へ突出し更に右方へ曲折した平面視Ｌ字状の案内ピン７５と、開閉蓋６１に形成された糸抜け防止用のリブ７６等で構成されている。

【００５６】案内ピン７５は、前後方向に所定長さのある糸案内部を有し、この糸案内部を外部に臨ませるように、カセット本体６０と開閉蓋６１の頂部壁には、矩形切欠き状の開口部７７，７８が夫々対向状に形成され、外部の糸駒から供給される上糸を開口部７７，７８から第１案内部６９へ導入可能になっている。糸駒６２から繰り出された上糸２４は、案内ピン７５の糸案内部に前後方向に移動自在に掛けられ、これにより糸駒６２と第１案内部６９間の距離があまり長くない場合でも、糸駒６２から上糸２４を円滑に引き出すことができる。

【００５７】第１挟持部７０について説明すると、図２

３、図２４に示すように、第１挟持部７０は、糸経路５９の上流側部分において上糸２４に通過抵抗を与えると共に上糸に糸よりによる糸の絡まり等が発生するのを防止する為のものであり、この第１挟持部７０は、カセットケース５７内の左端部の上端付近に設けられている。第１挟持部７０は、糸案内部８０ａを有する押え板８０と、この押え板８０に上糸２４を押圧する板バネ８１とを備えた糸より発生防止機構８２からなる。

【００５８】押え板８０と板バネ８１はカセット本体６０の仕切壁６６に固定されている。押え板８０の糸案内部８０ａは、上方開放の狭幅の切欠きであり、糸案内部８０ａがカセット本体６０よりも前方へ突出している。板バネ８１は糸案内部８０ａの左側面に当接して糸案内部８０ａとの間に上糸２４を挟持し、上糸２４に通過抵抗を付与することにより上糸２４に糸よりによる糸の絡まり等が発生するのを防止する。

【００５９】次に、図１４、図１５、図１７～図２１、図２６、図２７に示すように、第２，第３案内部７１，７２と第２挟持部７３は、糸経路５９の下流側部分に設けられている。第２案内部７１はカセットケース５７内の左端部の下端部にあり、第３案内部７２はカセットケース５７内のうちの糸調子器収容部５７ｃと天秤移動領域５７ｂの境界部の下端部にあり、第２挟持部７３はカセットケース５７内の右端近傍の下端付近にある。

【００６０】上糸２４は、第１案内部６９から第１挟持部７０へ斜めに延び、この第１挟持部７０から第２案内部７１へ鉛直に延び、第２案内部７１から第３案内部７２へ水平に延び、第３案内部７２から第２挟持部７３へほぼ水平に或いは傾斜状に延びている。このように、上糸２４は、カセットケース５７の下端部に沿って横断する状態に導かれている。

【００６１】第２案内部７１は、カセット本体６０の後壁部に設けたピン支持部８３と、このピン支持部８３に固定されて前方へ突出する案内ピン８４と、開閉蓋６１に形成された糸抜け防止用のリブ８５などからなる。ピン支持部８３とリブ８５とで上糸２４の前後方向位置が適切に設定される。第３案内部７２は、カセット本体６０の後壁部に設けたピン支持部８６と、このピン支持部８６に固定されて前方へ突出する案内ピン８７と、開閉蓋６１に形成された糸抜け防止用のリブ８８などからなる。ピン支持部８６とリブ８８とで上糸２４のの前後方向位置が適切に設定される。

【００６２】次に、第２挟持部７３について説明する。図１４、図１５、図１７～図２１、図３３～図３６に示すように、第２挟持部７３は、糸出口６８の付近において上糸２４に通過抵抗を与えるものである。上糸カセット２をカセット装着部３に未装着の状態においても、装着完了しない状態においても、第２挟持部７３は上糸２４に第１挟持部７０よりも強い通過抵抗を与えるように構成してある。そのため、上糸カセット２の装着時に上糸２４を天秤２５の糸掛け部２６と糸調子器９に糸掛けする際に、第２案内部７１と第２挟持部７３の間で、上糸２４が緊張状態を維持するため、天秤２５の糸掛け部２６と糸調子器９に確実に糸掛けすることができるうえ、その糸掛けに際して必要な上糸２４を糸駒６２から確実に上糸２４を繰り出すことができる。つまり、第３案内部７２と第２挟持部７３とが、天秤２５の糸掛け部２６に糸掛けする際にその上糸２４を操作する上糸操作部として機能とする。

【００６３】第２挟持部７３は、軸心を左右方向に水平に向けた可動の可動軸部材９４と、上糸２４を案内する案内ピン８９と糸保持板９０と板バネ部材９１などで構成されている。可動軸部材９４は、小径の軸部と、カセット本体６０の下端部の右側面に対して出没自在の大径の操作用ボタン９４ａとからなる。この可動軸部材９４は、カセット本体６０の右端近傍かつ下端近傍部の縦壁部９２，９３に左右方向へ水平移動可能に装着され、板バネ部材９１で右方へ弾性付勢されている。

【００６４】可動軸部材９４の左端部には、案内ピン８９の後端部が前後方向向きに貫通固着され、案内ピン８９と縦壁部９３の左側面の間には、案内ピン８９との間に上糸２４を保持する糸保持板９０が固着され、可動軸部材９４と共に右方へ付勢された案内ピン８９と糸保持板９０との間に上糸２４を挟持することで、上糸２４に通過抵抗を付与するようになっている。

【００６５】図１４、図１８に示すように、上糸カセット２をカセット装着部３から取り外した状態においては、板バネ部材９１の付勢力により、操作用ボタン９４ａの先端部がカセット本体６０の右側面から突出している。そのため、上糸カセット２をカセット装着部３に装着しない状態において、糸駒６２から上糸２４を繰り出す場合には、操作用ボタン９４ａを指で押し込むことで、可動軸部材９４と案内ピン８９を左方へ移動させて第２挟持部７３を開放状態にし、第１挟持部７０の通過抵抗に抗して上糸２４を繰り出すことができる。そして、後述のように、上糸カセット６２をカセット装着部３に装着完了した状態では、上糸２４に通過抵抗を与えないように第２挟持部７３は開放状態となる。

【００６６】図１９、図２０に示すように、上糸カセット２をカセット装着部３に装着完了した状態においても第２挟持部７３を開放状態にする為に、カセット装着部３の右側壁に操作用ボタン９４ａを逃す為の縦溝部９５ａと、上糸カセット２の装着完了状態において操作用ボタン９４ａを退入状態にする上糸開放カム９５が形成されている。これらについてはカセット装着部３の説明において後述する。

【００６７】上糸カセット２をカセット装着部３に装着完了した状態では、第２挟持部７３は開放状態となるが、上糸カセット５７内の糸調子器収容部５７ｃに突入する糸調子器９に上糸２４が挟持されて通過抵抗を付与

されるため、第１挟持部７０と糸調子器９との間の上糸２４は緊張状態を維持する。そのため、糸経路５９の糸調子器９よりも上流側の上糸２４に糸よりによる糸の絡まり等が発生することはない。尚、前記糸調子器９をアーム部６に装備する代わりに、上糸カセット２内に糸調子器９を装備することも可能であり、この場合も前記同様に、第１挟持部７０と糸調子器９間の上糸２４が緊張状態を維持するため、糸よりにいる糸の絡まり等が発生するのを防止できる。

【００６８】前記のように、上糸２４を第１挟持部７０で挟持し、かつ糸調子器９の後記糸調子皿間で挟持して通過抵抗を与え、これらの間でその上糸を緊張状態とした場合、糸調子器９の糸調子皿の入口部分で上糸が挟持されて抵抗が加わると、この部分において、その糸本来の構造上のよりがさらに締まる方向に強化されるので、前記第１挟持部７０と糸調子器９の糸調子皿との間の上糸部分には、常に、糸本来の構造上のよりがさらに強化された糸よりが発生している。

【００６９】この状態で、もしも、この間の上糸部分が弛んだ場合、この上糸部分のある所で折れ曲がって、この部分を中心として糸同士が直線状やだんご状に絡まる現象が生じる。このような絡まり部分が糸調子器９の糸調子皿に案内されると、その糸調子皿に引っ掛かって糸切れや糸の引きつり等が発生する。しかしながら、前記のように、上糸２４を前記第１挟持部７０と糸調子器９の糸調子皿とでそれぞれ挟持してこの間の上糸部分を緊張状態としておくことにより、前記のような絡まり現象が発生しない。尚、糸調子器９の糸調子皿を通過した上糸部分は、前記のように強化された糸よりが戻される。

【００７０】次に、上糸カセット２をカセット装着部３に装着する際に、糸調子器９をカセットケース５７内の糸調子器収容部５７ｃに突入させる為の構成について説明する。図１、図１４、図１５、図２３、図２６、図３０、図３１に示すように、糸調子器収容部５７ｃの下方において、カセット本体６０と開閉蓋６１の底壁には、矩形切欠き状の開口部９７，９８が夫々対向状に形成され、カセット本体６０の後壁部には、開口部９７に連なる部分長円形状の切欠き部９６が形成されている。上糸カセット２の装着の際、切欠部９６と開口部９７，９８を通って糸調子器９が糸調子器収容部５７ｃに突入状に収容される。

【００７１】図１、図３、図１１～図１５、図２６、図２７、図３０、図３１に示すように、天秤移動領域５７ｂの下方において、カセット本体６０と開閉蓋６１の底壁には、矩形切欠き状の開口部102,103 が夫々対向状に形成され、カセット本体６０の後壁には、開口部102 に連なり且つ下端から上端近くまで延びる縦長のスリット101 が形成され、上糸カセット２をカセット装着部３に装着する際に、これら開口部102,103 とスリット101 を通って天秤２５の糸掛け部２６と糸案内部材106Aがカセットケース５７内へ突入状に導入される。

【００７２】図２１、図２２、図２４に示すように、カセット本体６０の後壁のうちの糸駒収容部５７ａに面する後壁は、糸駒６２の収容のために後方へ部分円筒状に膨出しており、その部分円筒部の下端に対応する部位には、カセット装着部３の後述の受止め部109 に上方から係合して上糸カセット２の高さ位置を決定する係合部112 が形成されている。カセット本体６０の後壁の左右両端部には、カセット装着部３の後述のガイド溝110,111 に夫々係合可能な突条的な係合部113,114 が形成されている。上糸カセット２をカセット装着部３に装着した状態で、開閉蓋６１の前面がアーム部６の前面と同一面となし、カセット本体６０と開閉蓋６１の上壁がアーム部６の上面と同一面をなすように形成されている（図１９、図２２参照）。

【００７３】次に、上糸カセット２の糸止め部104 について説明する。図２５、図３０、図３５、図３６に示すように、カセットケース５７の外面部のうち、開閉蓋６１の枢支部の面取り部105 と、開閉蓋６１を閉じた状態でこの面取り部105 に接するカセット本体６０との間に、上糸カセット２の外部へ延びた上糸２４の糸端側部分を仮止めするように構成され、これら面取り部105 とカセット本体６０の一部とで糸止め部104 が構成される。但し、糸止め部104Aとして、図３５、図３６に示すように、カセットケース５７の外面部に、ケース側に付勢された板バネ片を設け、この板バネ片に上糸２４の糸端部分を仮止めするように構成してもよい。

【００７４】次に、上糸カセット２を上方から着脱自在に装着する為のカセット装着部３について説明する。図１、図２、図４、図２１に示すように、操作体装着部としてのカセット装着部３は、ミシンのアーム部６の先端側部分（アーム頭部）の前面部に正面視にて縦長の長方形状に且つほぼ左右に細長の長方形断面溝状に形成されている。カセット装着部３の右端側部分には、天秤２５の糸掛け部２６が往復移動する上下に細長い天秤移動領域２７が設けられ、この天秤移動領域２７を除くカセット装着部３の大部分は天秤移動領域２７の左側に位置している。

【００７５】糸駒保持部５８に保持した糸駒６２の軸心を天秤２５の糸掛け部２６の往復移動方向とほぼ平行にして、鉛直方向上方から上糸カセット２を装着したり、鉛直上方へ上糸カセット２を取り外したりできるようにカセット装着部３の上端と下端は開放状に形成されている。カセット装着部３の中央よりもやや左側部位の下端付近には、糸調子器９がその軸心を前後方向向きにして前方へ突出する状態に設けられている。カセット装着部３の後壁の下部には、上糸カセット２の係合部112 を受け止めて、上糸カセット５７を所定の高さ位置に位置決めする段状の受止め部109 が形成されている。カセット装着部３の左側壁と右側壁の後端付近には、上糸カセッ

ト２の係合部113,114 を夫々摺動自在に導入して案内するガイド溝110,111 が夫々形成されている。

【００７６】次に、第２挟持部７３を開放状態に切換える為にカセット装着部３に設けた上糸開放カム９５について説明する。図１８、図２０に示すように、カセット装着部３の右側壁の後部には、前記の縦溝部９５ａとその終端側に位置する上糸開放カム９５が形成されている。縦溝部９５ａはカセット装着部３の上端から下端付近部まで連続しており、上糸開放カム９５は縦溝部９５ａの下端にテーパ部９５ｂを介して連続し縦溝部９５ａよりも左側へ突出している。

【００７７】従って、図１７、図１８に示すように、上糸カセット２をカセット装着部３に装着して装着完了直前まで、カセット本体６０の右側面から突出した操作用ボタン９４が溝部９５ａに沿って移動する。このとき、第２挟持部７３は上糸２４に通過抵抗を付与する。上糸カセット５７をカセット装着部３に完全に装着し上糸カセット５７の装着が完了した状態では、操作用ボタン９４が上糸開放カム９５に当接して左方へ押動された状態となる。このとき、第２挟持部７３は開放状態となり、上糸２４に通過抵抗が付与されなくなる。

【００７８】次に、天秤機構８について詳しく説明する。図１１～図１４に示すように、この天秤機構８は、上糸カセット２をカセット装着部３に装着する動作に連動して糸掛け部２６に上糸２４を糸掛けできるように工夫した特有の構造のものである。この天秤機構８は、カム式天秤機構を例としているが、リンク式天秤機構にも同様に、以下の構成を適用可能である。この天秤機構８は、主軸の駆動力で天秤クランク２０を介して駆動される天秤２５と、この天秤２５の糸掛け部２６の移動軌跡の全長に沿って湾曲状に延びる糸案内隙間１０８を形成する糸案内部材106Aを有し、この糸案内隙間１０８に上方から上糸２４を導入して糸掛け部２６に糸掛け可能に構成してある。

【００７９】糸案内部材106Aは、天秤２５の先端部（糸掛け部26）の移動軌跡の全長に沿って湾曲状に延び糸案内隙間１０８を空けて前後に離隔した１対の糸案内具106 からなる。１対の糸案内具106 は下端部で連続した１本の線状部材（金属製又は合成樹脂製）で構成され、後側の糸案内具106 の上端部分が後方へ水平に延びてミシン機枠の頂部枠に枢支金具107 を介して回動自在に支持され、糸案内部材106Aの下端部は自由端をなしている。前側の糸案内具106 の上端部は前側へ屈曲されて、糸案内隙間１０８へ上方から上糸２４を導入する為の導入口108aが形成されている。尚、糸案内部材106Aと天秤２５の糸掛け部２６は、カセット装着部３の後壁の開口からカセット装着部３内へ突出している。

【００８０】天秤２５の先端側部分には、先端側所定長さ部分を後方へ折り返すことで形成された平面視にてU形の案内部２５ａが設けられている。１対の糸案内具106 はU形案内部２５ａを相対摺動自在に挿通しており、U形案内部２５ａが上下に往復運動するとき、１対の糸案内具106 は上端部において回動しながらU形案内部２５ａで案内されるため、U形案内部２５ａに対する摺動抵抗も小さく、騒音も殆ど発生しない。U形案内部２５ａのうちの１対の糸案内具106 の間（つまり、糸案内隙間108 ）に対応する部位には、上方から上糸２４を掛ける糸掛け部２６であって上面に上糸を掛けるU形凹部を有する糸掛け部２６が形成されている。

【００８１】従って、糸駒６２の軸心を天秤２５の糸掛け部２６の往復移動方向とほぼ平行にして、上糸カセット２を鉛直上方から装着するとき、その装着動作に連動して自動的に、上糸カセット５７の第３案内部７２と第２挟持部７３の間の上糸２４を導入口108aから糸案内隙間108 に導入して天秤２５の糸掛け部２６に簡単に掛けることができる。尚、糸案内部材106Aは、線状部材ではなく、金属製又は合成樹脂製の板状部材で構成してもよい。

【００８２】次に、上糸カセット２の作動を自動糸通し機構１０に伝達する伝達機構115 について説明する。図５～図８に示すように、この伝達機構115 は、上糸カセット２の作動を糸通しスライダ作動機構116 を介して自動糸通し機構１０に伝達すると共に、糸通し位置決め部材５２との係合により解除作動する係合機構117 が設けられている。この糸通しスライダ作動機構116 は、糸通しスライダ作動部材軸118 （以下、軸118 という）と、糸通しスライダ作動部材119 と、糸通しスライダ作動部材レバー120 （以下、レバー120 という）と、糸通しスライダ作動爪121 （以下、作動爪121 という）と、糸通しスライダ作動爪バネ122 （捩じりバネ122 ）と、糸通しスライダ作動部材ストッパー123 （以下、ストッパー123 という）等から構成されている。

【００８３】図４、図５、図１０に示すように、カセット装着部３の近傍においてアーム部６内には、軸118 が鉛直方向に支持され、この軸118 に側面視略コ字形状の糸通しスライダ作動部材119 が上下動可能に支持されている。糸通しスライダ作動部材119 には平面視コ字形状のレバー120 が固着され、このレバー120 の前板部のうち右端の略中段部に、板状のレバー部120aが前方に突出するように設けられている。レバー部120aの先端部は、アーム部６内からカセット装着部３の受止め部109 を貫通して所定長さ突出するように形成されている。受止め部109 の略中段部から下端にわたりスリット124 が形成され、レバー部120aがこのスリット124に沿って上下動可能に構成されている。

【００８４】軸118 の上端近傍の天板にはブラケット125 が固着され、軸118 の背面側で且つストッパー123 とレバー120 とにわたり引張コイルバネ126 が介装され、レバー120 （つまりレバー部120a）を上方に付勢するようになっている。尚、上糸カセット２の装着完了状態

（縫製位置）を保持するため、引張コイルバネ126 の付勢力よりも糸保持ボタン９４とカム９５間に作用する摩擦抵抗が大きくなるように構成されている。

【００８５】係合機構117 について説明すると、図４～図８に示すように、レバー120 の右端側上部には、作動爪121 が枢支されている。この作動爪121 は、その下端部が糸通しスライダ爪４４の爪部４４ａに係合可能なロック位置と、爪部４４ａとの係合状態が解除された解除位置とにわたって揺動可能に構成されている。但し、枢支軸127 には、糸通しスライダ作動部材119 、作動爪121 間に作用する捩じりバネ122 が外装され、作動爪121 をロック位置側に付勢するようになっている。

【００８６】作動爪121 の下端部は、オフセット部材カム部５３に対して当接離隔可能に構成され、糸通しスライダ作動部材119 をロック位置の状態で下方に押し下げると、作動爪121 の下端部がオフセット部材カム部５３の傾斜部５３ａに当接し傾斜部５３ａに沿って左方に移動し、オフセット部材４８の上支持部４９の右端部分が、糸通し位置決め部材５２に上方から当接した状態で、図６に示すように、解除位置に切り換わって係合機構117 が解除作動されるように構成されている。作動爪121 が解除位置に切換わると、糸通しスライダ４０及びオフセット部材４８は、図６に示す下限位置から圧縮コイルバネ４６，４７の付勢力により上方復帰するようになっている。

【００８７】ストッパー123 について説明すると、図４～図８に示すように、ブラケット125 の左端部には、ストッパー軸128 が前後方向向きに支持され、このストッパー軸128 に側面視略逆Ｌ字形状のストッパー123 が枢支されている。ストッパー123 は、ストッパー軸128 から略鉛直下方向きに延びる鉛直部129 と、ストッパー軸128 から略水平右向きで且つ針棒１８の上方位置まで延びる水平部130 と、これら鉛直部129 と水平部130 を図８において時計回り方向に付勢する前記引張コイルバネ126 （図１０参照）とを有する。鉛直部129 の下端部には、下方に向かう程左斜め向きに傾斜する傾斜部131 が形成されている。

【００８８】傾斜部131 と鉛直部129 の交差する左端部分にストッパー部132 （段部に相当する）が形成され、糸通しスライダ作動部材119 の下端部には、このストッパー部132 に上方から係合可能なストッパー係合部119aが形成されている。針棒１８の上端つまりストッパー123 が（イ）から（ロ）の適正範囲にある場合（図８参照）には、上糸カセット２により糸通しスライダ作動部材119 が図５に示す上限位置から下方に移動するとき、ストッパー係合部119aがストッパー123 の傾斜部131 に接触し、その後、傾斜部131 の左端に対して糸通しスライダ作動部材119のガイド壁119bが摺動する。

【００８９】糸通しスライダ作動部材119 の下方移動に伴い、ストッパー123 が引張コイルバネ126 の付勢力に抗して反時計回り方向に揺動するから、糸通しスライダ作動部材119 は上限位置から図６に示す下限位置まで移動可能となる。針棒１８の上端が適正範囲外にある場合には、ストッパー123 が（ロ）の位置（図８参照）から更に時計方向回りに揺動する。この状態で糸通しスライダ作動部材119 を下方に移動させようとしても、ストッパー部132 に対してストッパー係合部119aが係合するから、糸通しスライダ作動部材119 は移動不可能となり、糸通しが禁止される。

【００９０】図７に示すように、糸通しスライダ作動部材119 のガイド壁119bが、ストッパー123 の傾斜部131 に摺動することで、ストッパー123 の水平部130 の高さ位置が規制されて、最上位置のときの針棒１８の上端と水平部130 との間に微小隙間Ｓが形成され、針棒１８とストッパー123 との打撃音の発生を防止している。

【００９１】次に、糸調子器９と、糸調子器９の為の連動機構134 について説明する。連動機構134 は、上糸カセット２のカセット装着部３への装着動作の途中において上糸カセット２により１対の糸調子皿133 を開放させ且つ装着動作の完了時には糸調子皿133 を閉じさせる機構である。図４、図１０、図１６、図３７～図４５に示すように、糸調子器９は、上糸カセット２がカセット装着部３に装着された状態ではカセットケース５７内の糸調子器収容部57c に突入する。糸調子器９は１対の糸調子皿133 と、これら糸調子皿133 を支持する軸部材と、後側の糸調子皿133 の後側にある作動板139 と、後側の糸調子皿133 と作動板139 を前方へ弾性付勢するバネ部材と、糸調子皿133の付近で上糸２４を弾性的に支える糸調子バネ135 と、バネ力調節用の糸調子ダイヤル136 などを備えた一般的な構造のものである。

【００９２】図３７～図４５に示すように、連動機構134 は、上糸カセット５７の後側面に形成されたカム部137 と、縦向きのレバー状のカム従動部材138 と、回動アーム151 とを有する。カセット本体６０の後壁のうち左端側部分の上半部には、後方にやや突出する突条のようなカム部137 が形成されている。糸調子器９を支持するフレーム140 の上部にはブラケット141 が形成され、このブラケット141 には、カム従動部材138 の長さ方向途中部が左右方向向きの水平ピンにて回動自在に支持され、このカム従動部材138 は捩じりバネ144 により図４１において時計回り方向へ付勢されている。

【００９３】カム従動部材138 の上端部にはローラ142 が遊転可能に枢着されている。カセット装着部３の後壁の左側部分には、上糸カセット５７のカム部137 を後方へ突出させるスリット143 （図１４参照）が形成され、このスリット143 から後方へ突出したカム部137 にローラ142 が当接可能になっている。回動アーム151 の右端部は縦向きのピンにてベース板155 の下板部にピン連結されて水平回動可能であり、カム従動部材138 の下端部が回動アーム151 の左端部分の後面に当接し、回動アー

ム151 の突部151aが作動板139 に当接可能になっている。

【００９４】カム部137 の形状とローラ142 の位置を適切に設定することで、上糸カセット５７の装着途中において糸調子皿133 を開かせて１対の糸調子皿133 と糸調子バネ135 に糸掛けし、その後上糸カセット５７の装着完了時に糸調子皿133 を閉じるように構成してある。即ち、上糸カセット５７がカセット装着部３に装着されて上糸カセット２が糸調子器９の上方所定距離まで達したときに、カム部137 にローラ142 が乗り上げてカム従動部材138 が図４１において反時計回りに回動し、回動アーム151 と作動板139 とで糸調子皿133 を開かせる。

【００９５】その状態で上糸カセット５７が下降して来ると、第２、第３案内部７１，７２間の上糸２４が１対の糸調子皿133 の間に糸掛けされ、その後上糸カセット５７が装着完了状態になる頃カム部137 は低くなりローラ142 を後方へ押さなくなるので、回動アーム151 が後方へ復帰回動し、作動板139 が後方へ復帰移動し、１対の糸調子皿133 が閉じた状態になる。尚、以上の上糸カセット５７の装着時の連動機構134 の作動は、押え上げレバー２９の位置（下方回動位置または上方回動位置）に関係なく生じる。

【００９６】次に、通常のミシンと同様に、押え上げレバー２９の操作で１対の糸調子皿133 を開かせる機構は、周知の機構であるので簡単に説明する。図３７～図４５に示すように、押え上げレバー２９の上端部は機枠に回動自在に枢支され、この押え上げレバー２９のカム部２９ａに係合した係合アーム152 の上端部も機枠に回動自在に枢支されている。係合アーム152 は連結ロッド153 により水平な三角板154 の後端部に連結されている。三角板154 は機枠側のベース板155 下板部の下側に配設され、この三角板154 の前端部の左端部がベース板155 の下板部に縦向きのピンにて回動自在に枢着され、三角板154 の前端部の右端部が作動板139 に当接している。

【００９７】従って、押え上げレバー２９が下方回動位置にあるとき、連結ロッド153 が右方へ引っ張られないので三角板154 が回動せず、糸調子皿133 が閉じた状態を保持する。押え上げレバー２９を上方回動位置に切換えると、連結ロッド153 が右方へ引っ張られるため三角板154 が回動して糸調子皿133 が開いた状態となる。

【００９８】次に、前記ミシン１の作用と上糸カセット２の作用について説明する。図１４、図２３～図２７に示すように、上糸カセット２をカセット装着部３に装着してない状態において、上糸カセット２の開閉蓋６１を開き糸駒６２を糸駒保持部５８に装着する。次に、糸駒６２から引き出した上糸２４を第１案内部６９に掛け、第１挟持部７０の糸案内部８０ａに掛けて板バネ８１で押圧する。次に、その上糸２４を第２，第３案内部７１，７２に順々に掛け、第２挟持部７３の案内ピン８９と糸保持板９０との間に挟持させる。

【００９９】次に、板バネ部材９１の付勢力に抗して操作用ボタン９４ａを指で押圧し、案内ピン８９を糸保持板９０から離隔させてから、上糸２４を外部へ所定長さ引っ張り出し、その後操作用ボタン９４ａを押圧するのを解除して第２挟持部７３のにより上糸２４を挟持し、開閉蓋６１を閉じる。尚、上糸カセット２への糸掛け手順を判り易くするため、第１案内部６９、第１挟持部７０、第２，第３案内部７１，７２、第２挟持部７３の各近傍に糸掛け順指示マークを貼着し、そのマークの順番に従って糸掛けさせるように構成してもよい。

【０１００】一方、ミシン１が縫製停止状態のときには、通常針棒１８は針上位置に停止しており、天秤２５の糸掛け部２６は図１３に示す糸締め側の略中段位置に停止している。この状態において、カセット装着部３に上方から上糸カセット２を装着していく。カセット装着部３は上方と下方の両方に開放されているため、上糸カセット２の糸出口６８から約２０ｃｍ程度引出された上糸２４は、カセット装着部３の下方に鉛直向きに垂れ下がる。尚、縫製開始時には、天秤２５の糸掛け部２６は前記の糸締め側の略中段位置から上昇してから下降することになる。

【０１０１】図１５、図１６に示すように、上糸カセット２の装着途中において、上糸カセット２の係合部112 がレバー部120aに当接した状態で上糸カセット２を一旦停止させる。このとき、図１５に示すように、第３案内部７２と第２挟持部７３との間の上糸２４が糸案内隙間108 に導入されて天秤２５の糸掛け部２６に掛かった状態になっている。この場合、第２挟持部７３は第１挟持部７０よりも強い通過抵抗を与えるから、上糸２４がカセット２内に引き戻されることなく糸駒６２から上糸２４が必要量繰出される。尚、この移動停止位置を確認する為の１対の合印146 が上糸カセット２とミシン１に設けられている。

【０１０２】次に、上糸カセット２の糸出口６８から下方に垂れ下がった上糸２４を、針棒糸掛け147 と糸ガイド３６ａに順に掛け、支持板５５と糸案内皿５６との間に微圧にて挟持させた後、糸端を図示外の糸切り刃で切る。次に、図１７に示すように、上糸カセット２を引張コイルバネ126 の付勢力に抗して下方に押下げると、上糸カセット２の作動が伝達機構115 を介して自動糸通し機構１０に伝達され、針穴１９ａへ上糸２４を通す糸通しが実行される。上糸カセット２の糸通し作動部としての係合部112 がレバー120 の先端のレバー部120aを下方へ移動させるため、上糸カセット２の移動が伝達機構115 に伝達される。これと並行して、天秤２５に対して上糸カセット５７が相対的に下方移動するため、第３糸案内部７２と第２挟持部７３間の糸経路が長くなる関係上、糸駒６２からの上糸２４の繰り出しがなされる。

【０１０３】このとき、既述の如く、連動機構134 によ

り糸調子器９の糸調子皿133 を開放させ、第２，第３案内部７１，７２間の上糸２４が糸調子皿133 の間と糸調子バネ135 に糸掛けされる。第１挟持部７０と第２挟持部７３とにより両部間の上糸２４に一定の張力を付与しているから、天秤２５、糸調子皿133 、糸調子バネ135 に確実に上糸２４が掛かることになる。第２挟持部７３は第１挟持部７０よりも強い通過抵抗を上糸２４に与えるから、上糸２４が第２挟持部７３を逆流してカセット２内に引き戻されることはなく、前記のような糸掛けに必要な量の上糸２４は糸駒６２から確実に繰り出される。しかも、第１挟持部７０から第２挟持部７３間の上糸２４に弛みが生じないため、その上糸２４に糸よりにいる糸の絡まり等が生じることもない。

【０１０４】図１９、図２０に示すように、上糸カセット２をカセット装着部３に装着完了した状態（即ち、受止め部109 に係合部112 が上方から係合した状態）においては、連動機構134 により糸調子皿133 が閉じ、糸通しスライダ作動部材119 は上糸カセット２により最下位置に保持されたまま、糸通し軸３１とスライダーガイド軸３２が上方へ復帰して針穴１９ａに上糸２４が通される。また、図２０に示すように、操作用ボタン９４ａが糸開放カム９５で左方へ押動され、案内ピン８９が糸保持板９０から離隔して第２挟持部７３が開放状態となり、上糸２４が開放されて縫製可能状態となる。

【０１０５】しかも、上糸カセット５７の装着が完了した状態において、１対の糸調子皿133 が閉じ、第２挟持部７３が開放状態になった場合でも、第１挟持部７０で上糸２４を挟持し、上糸２４に通過抵抗を与えるようになっているため、上糸カセット５７内の上糸２４に糸よりによる糸の絡まり等が生じることはない。その結果、縫製中に糸の絡まりによる糸切れが生じにくくなる。このカセット装着部３に上糸カセット２を装着した状態において、糸案内部材106Aと天秤２５の糸掛け部２６が上糸カセット５７内へ突出し、天秤２５の糸掛け部２６が上糸カセット２内をほぼ鉛直方向に往復移動可能となる。

【０１０６】ここで、図１９に示すように、カセット本体６０の糸調子器収容部５７ｃにおいて、糸調子器の下流側に、下方に切欠き状に形成された糸案内部を含む上糸押え部材180 （鎖線で図示）を設け、上糸カセット２のカセット装着部３への装着動作により糸調子器９からその下流側に延びた上糸２４を下方に押下げ配置するようにしてもよい。この場合、上糸２４の糸調子器９の軸部材への接触部分が増し上糸２４が不意に外れたりしなくなるし、糸調子バネ135 による上糸２４の取り上げ量を多くすることができる。上糸カセット２を取り外す際には、上糸２４を上糸押え部材180 から簡単に解離することができる。

【０１０７】以上のように、上糸カセット５７をカセット装着部３に装着した状態で、糸駒６２から上糸２４を供給しながら縫製を行うことができる。上糸２４の糸色を変更したり、上糸２４を補充したりする為に、上糸カセット２をカセット装着部３から取外す際には、上糸カセット２の下端を指で上方へ押すことにより簡単に取外すことができる。

【０１０８】その取り外し後、上糸カセット２内には、天秤２５と糸調子器９から外された弛み糸が残るので、操作用ボタン９４ａを指で押して第２挟持部７３を開放状態に切換え、その状態のまま上糸カセット２内の弛み糸を外部へ引き出し、カセット外周に巻き付けて上糸２４の糸端部分を糸止め部104 又は糸止め部104 Ａ に仮止めする。その後、操作用ボタン９４を復帰させて第２挟持部７３を閉じた状態にする。

【０１０９】図４６、図４７に示すように、前記開口部７７，７８は、上糸カセット２の外部の糸駒６２Ａから延びた上糸を第１案内部６９に導入する導入用開口部７７，７８でもあり、上糸カセット２内の糸駒６２を取り外した状態で、上糸カセット２の外部の上糸２４を使用して縫製する場合には、その糸駒６２Ａから延びた上糸２４を導入用開口部７７，７８から第１案内部６９へ導き、糸経路５９を通って糸出口６８に導くことができる。例えば、図４８に示すように、針として２本針１９Ａを適用する場合には、上糸カセット２内部の糸駒６２の上糸２４と、外部の糸駒６２Ａの上糸２４とを糸経路５９を通して糸出口６８に導き、２本の上糸２４を２本針１９Ａに供給することが可能となる。

【０１１０】本実施形態に係るミシン１と上糸カセット２は次の効果を奏する。

１）上糸カセット２内に糸駒６２を収容し、上糸カセット２を交換することで糸駒６２を交換可能にしたので、上糸２４の交換が簡単になった。特に、上糸カセット２の装着動作に連動して、天秤２５の糸掛け部２６と糸調子器９の糸調子皿133 と糸調子バネ135 とに自動的に糸掛けするので、糸掛けの操作が非常に簡単になり能率的に行うことができる。上糸カセット２の装着動作に連動して、自動糸通し機構１０を作動させて針穴２９ａに自動的に糸通しするので、糸通しも非常に簡単になり、上糸２４の交換を迅速に能率的に行うことができる。

【０１１１】特に、縫製を停止し、針棒１８を針上位置に停止させると共に天秤２５の糸掛け部２６を糸締め側の位置に停止させた状態で、天秤２５の位置を変えることなく、上糸カセット２を装着して天秤２５の糸掛け部２６と糸調子器９にに糸掛けできるため、上糸カセット２の装着と糸掛けの操作が非常に簡単で能率的に行うことができる。しかも、上糸カセット２を上方から直線的に移動させることでカセット装着部３に装着でき、また、装着状態の上糸カセット２を上方へ直線的に移動させて取り外すことができるため、上糸カセット２の着脱操作が簡単で、上糸カセット２を迅速に交換できる。

【０１１２】また、上糸カセット２のカセットケース５

７が透明であり、内部の糸駒６２の糸色を容易に識別できるため、上糸２４の交換、或いは上糸カセット２の交換の際に便利である。上糸カセット２の内部の糸駒６２を支持する支持壁６３に凹部６５を形成したので、この凹部６５に指をかけて糸駒６２の下端を押し、糸駒６２を糸駒保持部５８から簡単に取り外すことができる。

【０１１３】２）上糸カセット２内に糸駒６２をその軸心を縦向きにして保持し、その糸駒６２から上方へ上糸２４を繰り出し、糸経路５９を通って糸出口６８に導くように構成したので、上糸カセット２の左右方向幅を小さくすることができる。或いは、糸駒６２の軸心と糸駒６２からの上糸２４の繰り出し方向を天秤２５の糸掛け部２６の往復移動方向とほぼ平行にして上糸カセット２をカセット装着部３に装着するように構成であるため、上糸カセット２の左右方向幅とカセット装着部３の左右方向幅を小さくすることができる。

【０１１４】このように、上糸カセット２は、左右方向幅の小さな縦長の直方体に近い小型のものであるので、天秤２５の糸掛け部２６の往復移動領域とその左側の部位に、つまりアーム頭部にカセット装着部３を配置することができた。その結果、天秤２５の糸掛け部２６の往復移動領域と重なる領域にカセット装着部３を形成することができスペース的に有利である。また、アーム部６の内部機構と干渉させずにカセット装着部３を極力後方に配置することができ、これにより上糸カセット２を装着した状態で上糸カセット２がアーム部６の前面から突出せず、アーム部６の外観も低下せず、アーム部６の前面のデザイン上の自由度も確保できる。

【０１１５】３）上糸カセット２内の糸経路５９の上流部に上糸２４に常時通過抵抗を与える第１挟持部７０を設け、上糸カセット２４を装着した状態で、第１挟持部７０と糸調子器９間の上糸２４を緊張状態に維持するため、糸よりによる糸の絡まりの発生を防止でき、縫製中に糸の絡まりに起因する糸切れや糸のひきつりを防止できる。

【０１１６】そして、糸出口６８の付近に第２挟持部７３を設け、上糸カセット２の装着前や装着完了前には上糸２４に通過抵抗を与えるようにし、第２挟持部７３は第１挟持部７０よりも強い通過抵抗を与えるため、上糸カセット２の取扱中に上糸２４が勝手に繰り出されることもなく、また、上糸カセット２の装着時に天秤２５の糸掛け部２６と糸調子器９に糸掛けする際に、上糸を糸駒６２から確実に繰り出すことができる。

【０１１７】そして、上糸カセット２を装着しない状態では、操作用ボタン９４ａを指で操作して第２挟持部７３を開放させ、上糸２４を自由に繰り出すことができる。上糸カセット２の装着完了後には操作用ボタン９４ａを上糸開放カム９５で押圧して第２挟持部７３を開放状態に切換えるため、縫製中には第２挟持部７３の通過抵抗が上糸２４に作用せず、上糸２４の繰り出しが円滑になる。上糸カセット２をカセット装着部３から取り外した際にカセットケース５７外へ延びる上糸２４をカセットケース５７の外面に巻付けて、その糸端部分を糸止め部104,104Aに止めることができるので、非常に便利である。

【０１１８】４）上糸カセット２の頂部に第１案内部６９と、前後に細長い開口部７７，７８と、これに平行に臨む案内ピン７５の糸案内部とを設けたため、上糸２４が案内ピン７５に沿って自由に移動でき、その上糸２４を糸駒６２から抵抗なく円弧を描くようにして円滑に繰り出すことができるうえ、上糸カセット２の外部に配置した糸駒からの上糸を開口部７７，７８から上糸カセット２内に導入し、その内部の糸経路５９により糸出口６８に導いて縫製に供することができる。そのため、針１９の代わりに２本針を装着して２本の上糸で縫製する際に、上糸カセット２内の糸駒６２と上糸カセット２外のアーム部６の頂部の糸駒保持部に保持した糸駒とから上糸を供給して縫製することができる。

【０１１９】５）上糸カセット２の装着動作に連動して糸調子器９を開放状態にし、上糸カセット２の装着後には糸調子皿133 を閉じる連動機構134 を設けたため、前記のように上糸カセット２の装着動作に連動して糸調子器９に糸掛けすることができる。尚、カセット装着部３の下端側部分に糸調子器９を配置したので、上糸カセット２をカセット装着部３に上方から装着する装着動作と連動して糸調子器９に糸掛けするのに特に有利である。

【０１２０】６）天秤機構８は特有の構造のものであり、上糸カセット２の装着動作に連動して糸掛け部２６に糸掛けするのに好適のものである。即ち、天秤２５の糸掛け部２６の移動軌跡の全長に沿って延びる湾曲状の糸案内隙間108 を形成する糸案内部材106Aを設け、糸案内隙間108 の上端の導入口108aから上糸２４を導入して糸掛け部２６に糸掛け可能に構成してある。そのため、糸導入口108aは糸掛け部２６の移動軌跡から後方へ後退しない位置にあるから、天秤２５の糸掛け部２６を前記の糸締め側の位置（針棒１８の針上停止位置に対応する位置）に停止させたまま、上糸カセット２のカセット装着部３への装着動作と連動して糸掛け部２６に糸掛けすることができる。

【０１２１】しかも、糸案内隙間108 は、糸掛け部２６の移動軌跡の全長にわたるものであり、糸案内部材106Aをなす１対の糸案内具106 を天秤２５のU形案内部２５ａに相対摺動自在に挿通させてあるので、縫製時に天秤２５が上下に往復移動しても、上糸２４は糸案内具106 で案内され、糸掛け部２６から外れることはない。また、後側の糸案内具106 の上端部を回動自在に枢支してあるため、天秤２５のU形案内部２５ａで１対の糸案内具106 を案内できるから、１対の糸案内具106 を線状部材のような加工し易い材料で安価に構成できるうえ、U形案内部２５ａと１対の糸案内具106 間に摺動抵抗が殆

ど作用しなくなり、摺動音も殆ど生じない。

【０１２２】７）前記自動糸通し機構１０において、針棒１８が針上位置のうちの所定高さ範囲にある場合に限り、つまり、ストッパ１２３が図８の（イ）～（ロ）の適正範囲にある場合に限り、上糸カセット２の装着動作と連動する針穴１９ａへの自動糸通しが可能になっているため、針棒１８の位置が不適切なまま、上糸カセット２を装着して針穴１９ａへの糸通しミスを起こすおそれがなく、操作の信頼性、操作性に優れる。しかも、針棒１８が針上停止する位置に誤差が生じることに鑑み、糸通しスライダ４０と、針棒１８に設けた糸通し位置決め部材５２との係合を介して、針棒１８に対する自動糸通し機構１０の高さ位置を合致させるように構成してあるため、針穴１９ａに確実に糸通しすることができる。

【０１２３】次に、前記実施形態を部分的に変更した変更更形態について説明する。図４９は、前記ミシン１の制御系の概要を示すものであり、制御ユニットには針上、針下検出センサ、主軸位相角検出センサ、その他図示外のセンサやスイッチ類からの信号が入力される。制御ユニットは、ミシン制御用の種々の制御プログラムに基づいて制御を行うコンピュータと複数の駆動対象機器の為の複数の駆動回路などを有する。この制御ユニットによりミシンモータ、針振り用ステッピングモータ、布送り用ステッピングモータ、などが駆動制御される。

【０１２４】前記針棒１８が針上位置にある場合にのみ、カセット装着部３への上糸カセット２の装着を許可し、針棒１８が針上位置以外の位置にある場合には上糸カセット２の装着を禁止する為に、カセット装着部３の上端付近にはカセット装着部３内へ出没可能なストッパを設け、このストッパを出没駆動する例えばソレノイドアクチュエータなどからなる電動アクチュエータを設け、針上、針下検出センサからの検出信号に基づいて制御ユニットにより電動アクチュエータを駆動制御し、針棒１８が針上位置にある場合にのみストッパを退入位置に保持することで上糸カセット２の装着を許可し、針棒１８が針上位置以外の位置にある場合にはストッパを進出位置に切換えて上糸カセット２の装着を禁止する構成とする。

【０１２５】次に、本発明の別実施形態について図面を参照して説明する。但し、前記実施形態と同じ部材には同一の符号を付して説明を適宜省略する。図５０～５２に示すように、別実施形態に係る電子制御式ミシン１Ａにおいて、アーム部６の先端側部分のうちの天秤２５の糸掛け部２６が上下に往復移動する天秤移動領域とその近傍部の前面部には操作体装着部200 が形成され、この体装着部200 に着脱可能に装着される可動操作体としての糸掛け用操作体201 と、糸調子器９と、抵抗付与部205 と、糸掛け用操作体201 の装着動作に連動して糸調子器９の糸調子皿133 と抵抗付与部205 を開閉させる連動機構202 （図５８参照）などが設けられている。

【０１２６】最初に糸経路について説明すると、図５０～図５２に示すように、アーム部６の基端側の頂部に横向きに保持された糸駒６２Ａから延びる上糸２４は、順次、アーム部６の上面側部分に形成された左右方向向きの糸案内溝203 、操作体装着部200 、アーム部６の先端側の前面部に形成された縦向きの糸案内溝204 を経由して針棒糸掛け147 、糸ガイド３６ａ、糸案内皿５６に掛けられる。糸案内溝203 にはその上流側から順に抵抗付与部205 と糸調子器９が配設されている。操作体装着部200 の中央部において上下に往復移動するように天秤２５の糸掛け部２６がが配設されている。尚、糸調子器９のバネカを調節する為の糸調子ダイヤル206 も装備されている。

【０１２７】次に、糸掛け用操作体201 について説明する。図５０、図５１、図５４、図５５、図５７～図５９に示すように、糸掛け用操作体201 は、鉛直方向に細長い略直方体状のもので、操作体装着部200 に対して少なくとも所定範囲内で移動可能である。糸掛け用操作体201 は、上端から下端のやや上方まで連なる前壁部201cと、左側壁201aと、右側壁201bとを有する。左側壁201aの後端には左方へ折曲された被案内部208 が形成され、この被案内部208 が操作体装着部200 のスリット200aで上下動可能に案内される。右側壁201bの後端には右方へ折曲された被案内部208bが形成され、この被案内部208bが操作体装着部200 の案内溝200bで上下動可能に案内される。糸掛け用操作体201 の前壁201cは、操作体装着部200 の前側の案内壁部200cで上下動自在に案内可能に構成してある。

【０１２８】左側壁201aと右側壁201bの下端面は水平に形成され、右側壁201bの下端部は糸掛け用操作体201 を操作体装着部200 に挿入装着する際に、糸調子器９から天秤２５に延びる上糸２４を操作して糸掛け部２６に糸掛けする上糸操作部である。糸掛け用操作体201 の上端部には、前方にやや突出する突出部209 が形成され、この突出部209 に指をかけて糸掛け用操作体201 を上方移動させ操作体装着部200 から離脱可能になっている。

【０１２９】図５０、図５３～図５５、図６２に示すように、被案内部208 の下端部には、上糸２４を針穴１９ａに糸通しする際に自動糸通し機構１０を作動させる糸通し作動部としての作動部208aが形成されている。糸通しスライダ作動機構116 において、レバー120 には右端の上段部から前方にＬ字状に突出するレバー部120bが形成され、糸掛け用操作体201 の装着動作の途中からレバー部120bを上方から押動駆動し、前記実施形態と同様の自動糸通し機構１０を作動させる。

【０１３０】操作体装着部200 の壁面には、操作体装着部200 から離脱させた糸掛け用操作体201 を図５４に示す最上位置に保持する板バネ210 がビス止めされている。尚、糸掛け用操作体201 を操作体装着部200 から取外し可能に構成してもよく、この場合には、天秤２５の

糸掛け部２６への糸掛けが簡単になる。操作体装着部200 は、アーム部６の前面近傍部であって天秤移動領域の近傍部に、糸掛け用操作体201 を鉛直に直線的な移動にて装着可能に形成され、糸掛け用操作体201 を円滑に挿入装着できるように構成してある。

【０１３１】次に、糸掛け用操作体201 の装着の動作を糸調子器９に連動させる連動機構202 について説明する。図５３～図６２に示すように、連動機構202 は、カム部211 とカム従動部材212 と作動板213 とを有し、糸掛け用操作体201 を操作体装着部200 に装着する装着動作の途中において糸掛け用操作体201 により糸調子器９の糸調子皿133 と抵抗付与部205 を開放させ且つ装着動作の完了時には糸調子皿133 と抵抗付与部205 を閉じるようになっている。即ち、図５４に示すように、糸掛け用操作体201 の右下半部には、上下方向に沿ってカム部211 が形成され、このカム部211 には下方から順に、傾斜部211a、平坦部211b、傾斜部211c、平坦部211dが形成されている。

【０１３２】ミシン機枠に枢支された支軸214 には、カム従動部材212 の下端部が回動自在に支持されている。このカム従動部材212 は、２枚のレバー部215,216 と、これらレバー部215,216 を下端部にて一体的に連結する連結部217 と、カム従動ピン218 などを有する。２枚のレバー部215,216 は、適当間隔空けて平行に且つ側面視で約１５度の位相角となるように配設され、レバー部215 の一端即ち上端部には、カム従動ピン218 が左方に突出するように付設され、このカム従動ピン218がカム部211 に当接可能に構成されている。

【０１３３】図５４、図５８に示すように、糸調子器9には、レバー部216 の上端部（カム従動部材の他端部）で押動駆動される作動板213 が設けられ、この作動板213 に押動駆動されて糸調子皿133 が開放する。支軸214 には、捩りバネ219 が外装され、図５８においてカム従動部材212 を反時計方向回りに付勢している。抵抗付与部205 は、糸調子器９よりも上流側において上糸２４に適度な通過抵抗を付与し、上糸２４に糸よりによる糸の絡まり等が発生するのを防止する為のものである。前記レバー部216 の上端部は右方へ直角に折曲され、その水平板部220 により、作動板213 が糸調子皿133 を開くのと同期して抵抗付与部205 の押え板205aを押動駆動して押え板205aを開くようになっている（図６０、図６１参照）。水平板部220 の非作動時には、押え板205aは抵抗付与バネ205bの付勢力により閉じた状態に保持されている。

【０１３４】次に、以上説明したミシン１Ａの作用について説明する。図５０～図５２に示すように、糸駒６２Ａより引出した上糸２４を操作者によって糸案内溝203 に通し、糸掛け用操作体201 を最上位置に移動させた状態において、上糸２４を天秤２５の糸掛け部２６に掛け、糸案内溝204 に通して針１９の付近まで引き出し、針棒糸掛け147 、糸ガイド３６ａ、糸案内皿５６に掛ける（図５参照）。次に、糸端を一定長さに切断し、糸掛け用操作体201 を操作体装着部200 に直線的に押込み操作して、操作体装着部200 に挿入装着していく。

【０１３５】この装着動作に伴い、先ず、カム従動ピン218 がカム部211 の傾斜部211aに当接して、糸調子皿133 と押え板205aを開放してこれらに上糸２４を糸掛けする。これと並行して、糸調子バネ135 にも糸掛けされ、糸掛け用操作体201 の右側壁201bの下端部の上糸操作部により、糸調子器９と天秤２５の糸掛け部２６間の上糸２４が天秤２５の両側の糸経路を長くするように下方へ押し下げられ、天秤２５の糸取り量が確保される。

【０１３６】その後、平坦部211b、傾斜部211cがピン218 に当接し、図６２、図６３に示す略装着完了状態において平坦部211dがピン218 に当接すると、糸調子皿９と押え板205aが閉じる。一方、糸掛け用操作体201 を操作体装着部200 に挿入装着する途中から、前記実施形態と略同様に、糸掛け用操作体201 の作動が伝達機構115を介して自動糸通し機構１０に伝達され、この自動糸通し機構１０により針穴１０ａへの糸通しが実行され縫製可能状態となる。このとき、作動部208aがレバー部120bを下方へ押動させるため糸掛け用操作体201 の装着動作が伝達機構115 に伝達される。

【０１３７】以上説明したミシン１Ａと糸掛け用操作体201 は、次の効果を奏する。

１）前記上糸カセット２の代わりに、鉛直方向に細長い糸掛け用操作体201 を採用しているため、糸掛け用操作体201 と操作体装着部200 の小型化を図ることができ、アーム部６の前面の外観への影響も少なくすることができる。

【０１３８】２）連動機構202 は、糸掛け用操作体201 を操作体装着部200 に装着する装着動作の途中において、その装着動作と連動して、糸掛け用操作体201 により糸調子器９の糸調子皿133 と抵抗付与部205 の押え板205aを開放させ、その開放状態の糸調子器９と抵抗付与部205 に上糸２４を掛けることができる。そして、糸掛け用操作体201 の装着動作の完了時には糸調子皿９と抵抗付与部205 を閉じさせることができる。この糸掛けと並行的に、糸掛け用操作体201 を操作体装着部200 に装着する装着動作と連動して、自動的に糸通しを行うこともできる。

【０１３９】こうして、糸掛け用操作体201 の装着に連動して上糸２４を糸調子器９と抵抗付与部205 に糸掛けすることができると共に自動糸通しを行うことができるため、上糸２４の補給や交換時の糸掛け操作と糸通し操作が簡単化し、上糸交換の作業効率が高まる。

【０１４０】３）連動機構202 は、糸掛け用操作体201 に形成されたカム部211 と、一端がカム部211 に当接可能で且つ長さ方向途中部が回動自在に支持されたカム従動部材212 と、このカム従動部材212 の他端部で押動駆

動されて糸調子器９を開放させる作動板213 とを有するため、糸調子器９としては一般的な構成の安価な糸調子器９を採用可能となる。

【０１４１】尚、前記糸掛け用操作体201 は、ミシン１Ａのアーム部６に直接連結しておらず、アーム部６から取り外し可能な構成であったが、糸掛け用操作体201 をアーム部６に平行リンク、その他のリンク機構や揺動リンク部材を介して連結した構成にしてもよい。

【０１４２】

【発明の効果】　請求項１の発明によれば、アーム部に少なくとも所定範囲内で移動可能な可動操作体を設け、この可動操作体の前記所定範囲内で移動させることにより、上糸を天秤の糸掛け部にセットすると共に、前記自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、可動操作体の移動に連動させて、天秤の糸掛け部に糸掛けし且つ上糸を針穴に糸通しすることができるため、天秤の糸掛け部への糸掛け作業や針穴への糸通し作業を簡単化し、作業能率を高めることができる。

【０１４３】請求項２の発明によれば、上糸を天秤の糸掛け部に糸掛けする際に上糸操作部により上糸を操作して糸掛けすることができるうえ、上糸を針穴に糸通しする際に糸通し作動部により自動糸通し機構を作動させて糸通しを行うことができる。その他請求項１と同様の効果を奏する。

【０１４４】請求項３の発明によれば、前記ミシンのアーム部の前部又は前面部に可動操作体を着脱可能に装着する為の操作体を形成したため、可動操作体の着脱操作を行いやすくなるうえ、アーム部の前面部に位置している天秤の糸掛け部や糸調子器に上糸を掛ける面でも有利である。その他請求項１又は２の発明と同様の効果を奏する。

【０１４５】請求項４の発明によれば、可動操作体は糸駒を収容しかつその糸駒から繰り出された上糸を天秤側へ供給する上糸カセットであるので、上糸カセットから上糸を供給可能である。この上糸カセットはアーム部に着脱可能なものであり、上糸カセットを装着側へ操作するだけで、天秤の糸掛け部への糸掛けと針穴への糸通しを簡単に行うことができ、上糸カセットを介して上糸の交換も簡単に行うことができる。その他請求項１～３の何れかと同様の効果を奏する。

【０１４６】請求項５の発明によれば、ミシンのアーム部の前面部に、前記操作体装着部としてのカセット装着部であって、上糸カセットの装着側が開放され且つ上糸カセットの着脱時に上糸カセットを直線状に案内する溝状のカセット装着部を形成したので、上糸カセットを装着する際には、カセット装着に上糸カセットを装着側から装着して直線的に移動させるという簡単な操作で装着できるし、上糸カセットを取り外す際に直線的に移動させることで取り外すことができる。その他請求項４と同様の効果を奏する。

【０１４７】請求項６の発明によれば、カセット装着部の一部に天秤の糸掛け部が上下動する天秤移動領域を設け、カセット装着部の他の一部に突出する糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を少なくとも天秤と糸調子器に糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、天秤と糸調子器への糸掛けと、針穴への糸通しを簡単に能率的に行うことができる。その他請求項５と同様の効果を奏する。

【０１４８】請求項７の発明によれば、カセット装着部に突出するように糸調子皿と糸調子バネとを含む糸調子器を設け、上糸カセットのカセット装着部への装着動作に連動して、上糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに糸掛けすると共に自動糸通し機構を作動させて上糸を針穴に糸通しするように構成したので、糸カセット内の上糸を天秤の糸掛け部と糸調子皿と糸調子バネとに自動的に糸掛けすることができ、自動糸通し機構を介して上糸を針穴に自動的に糸通しすることができ、上糸交換時の糸掛けと糸通しの作業能率を高めることができる。その他請求項６と同様の効果を奏する。

【０１４９】請求項８の発明によれば、上糸カセットをカセット装着部に途中の位置まで装着した状態で自動糸通し機構に手動にて上糸を掛け、その後の上糸カセットの装着動作により自動糸通し機構を作動させるように構成したので、上糸カセットをカセット装着部に途中の位置まで装着して、上糸カセットから手を離し得る状態になった状態で、自動糸通し機構に手動にて上糸を掛けることができ、その後の上糸カセットの装着動作により自動糸通し機構を作動させて糸通しを行うことができる。請求項５～８の何れかと同様の効果を奏する。

【０１５０】請求項９の発明によれば、可動操作体の作動を自動糸通し機構に伝達する伝達機構は、針棒又は針棒に固定された係合片との係合により解除作動する係合機構が設けられているため、停止状態の針棒の高さ位置に合わせて係合機構を解除作動させることができるから、針棒の高さ位置に応じて針穴の高さ位置がずれていても、確実に糸通しを行ってから解除作動させることができる。請求項１～８の何れかと同様の効果を奏する。

【０１５１】請求項１０の発明によれば、少なくとも針棒の作動位置を検出する検出手段を設け、この検出手段の検出信号を受け、針棒が所定位置にある場合だけ、可動操作体を移動可能に構成したので、針棒が所定位置にあって針穴の高さ位置が一定の高さ位置にある場合だけ、可動操作体を移動させて自動糸通し機構を作動させ、糸通しを円滑に行うことができ、針棒の高さ位置のズレに起因する糸通しミスを防止し、自動糸通し機構の破損を確実に防止することができる。その他請求項１～９の何れかと同様の効果を奏する。

【図面の簡単な説明】

【図１】本発明の実施形態の電子制御式ミシンと上糸カセットの正面図である。

【図２】上糸カセットを取外した状態のミシンの平面図である。

【図３】カセット装着部付近の内部構造を示す縦断面図である。

【図４】カセット装着部付近の内部構造等を示す平面断面図である。

【図５】針棒上下動機構と自動糸通し機構などの正面図である。

【図６】糸通し直前状態を示す図５相当図である。

【図７】針棒とストッパーとの関係を示す図５相当図である。

【図８】針棒の適正高さ範囲を説明する図５相当図である。

【図９】（ａ）は糸通しフックによる糸通し直前状態を示す斜視図、（ｂ）は糸通し直後状態を示す斜視図、（ｃ）は糸通し後に糸通しフックが上昇した状態の要部断面図である。

【図１０】糸通しスライダ作動機構と上糸カセットなどの縦断側面図である。

【図１１】天秤機構とカセット装着部を示す要部縦断側面図である。

【図１２】天秤の糸掛け部の移動範囲を示す要部縦断側面図である。

【図１３】糸掛け部への糸掛け可能範囲を示す図１２相当図である。

【図１４】上糸カセット（装着直前状態）とカセット装着部の正面図である。

【図１５】上糸カセット（装着途中状態）とカセット装着部の正面図である。

【図１６】上糸カセット（装着途中状態）とカセット装着部などの縦断側面図である。

【図１７】上糸カセット（装着完了直前状態）とアーム頭部の正面図である。

【図１８】第２挟持部とカムの部分拡大断面図である。

【図１９】上糸カセット（装着完了状態）とアーム頭部の正面図である。

【図２０】第２挟持部（開放状態）とカムを示す図１８相当図である。

【図２１】カセット装着部に装着された上糸カセットの横断面図である。

【図２２】上糸カセット（装着完了状態）とカセット装着部などの縦断側面図である。

【図２３】上糸カセット（開閉蓋開状態）の正面図である。

【図２４】上糸カセットの縦断側面図である。

【図２５】上糸カセットの平面図である。

【図２６】上糸カセットの底面図である。

【図２７】糸経路の下流側部分を示す上糸カセットの部分切欠き横断平面図である。

【図２８】カセット本体と糸駒（装着前状態）の縦断側面図である。

【図２９】カセット本体と糸駒（装着後状態）の縦断側面図である。

【図３０】上糸カセット（開閉蓋開状態）の正面図である。

【図３１】上糸カセット（開閉蓋開状態）の底面図である。

【図３２】第１案内部を示すカセット本体の平面図である。

【図３３】第２，第３案内部と第２挟持部を示す上糸カセットの底面図である。

【図３４】第２，第３案内部と第２挟持部を示すカセット本体の横断面図である。

【図３５】糸止めの手順を説明する上糸カセットの正面図である。

【図３６】糸止め部等を示す上糸カセットの側面図である。

【図３７】押え上げレバーと糸調子器と連動機構などの正面図である。

【図３８】押え上げレバーと糸調子器と連動機構などの側面図である。

【図３９】押え上げレバーと糸調子器と連動機構などの平面図である。

【図４０】上糸カセット装着時の状態を示す図３７相当図である。

【図４１】上糸カセット装着時の状態を示す図３８相当図である。

【図４２】上糸カセット装着途中の状態を示すの図３９相当図である。

【図４３】上糸カセット装着完了状態を示す図３９相当図である。

【図４４】上糸カセット装着完了状態を示す図３７相当図である。

【図４５】上糸カセット装着完了状態を示す図３８相当図である。

【図４６】上糸カセットの外部の上糸を使用して縫製する場合のミシンの正面図である。

【図４７】上糸カセットの外部の上糸を使用して縫製する場合のミシンの平面図である。

【図４８】２本針を適用した場合のミシンの正面図である。

【図４９】ミシンの制御系の概略ブロック図である。

【図５０】別実施形態の電子制御式ミシンと糸掛け用操作体の正面図である。

【図５１】ミシン及び糸掛け用操作体の側面図である。

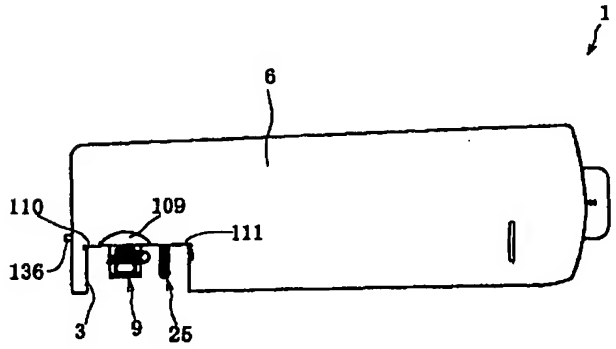
【図５２】ミシンの平面図である。

【図５３】操作体装着部付近の内部構造要部を示す部分

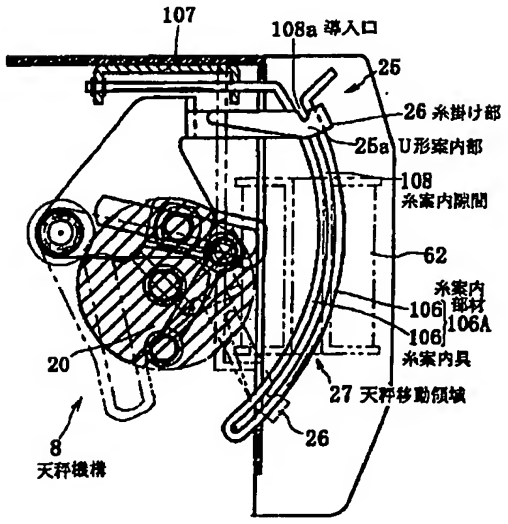
切欠き横断面図である。
【図５４】操作体装着部付近と糸掛け用操作体の縦断面図である。
【図５５】糸掛け用操作体の装着完了状態を示す要部横断面図である。
【図５６】操作体装着部の下端部付近の要部横断面図である。
【図５７】天秤機構と糸掛け部と糸掛け用操作体の関係を示す縦断面図である。
【図５８】連動機構と糸調子器との関係を示す縦断面図である。
【図５９】連動機構と抵抗付与部との関係を示す縦断面図である。
【図６０】抵抗付与部（閉状態）の拡大断面図である。
【図６１】抵抗付与部（開放状態）の拡大断面図である。
【図６２】操作体装着部付近と糸掛け用操作体（装着完了状態）の図５４相当図である。
【図６３】操作体装着部付近と糸掛け用操作体（装着完了状態）の図５７相当図である。
【符号の説明】

１，１Ａ	ミシン
２	上糸カセット
３	カセット装着部
６	アーム部
８	天秤機構
９	糸調子器
１０	糸通し機構
２４	上糸
２５	天秤
２５ａ	Ｕ形案内部
２６	糸掛け部
２７	天秤移動領域
５７	カセットケース
５８	糸駒保持部
５９	糸経路
６２	糸駒
６５	凹部
６８	糸出口
６９	第１案内部
７０	第１挟持部
７１	第２案内部
７２	第３案内部
７３	第２挟持部
８０	押え板
８１	板バネ
８２	糸より発生防止機構
８４	案内ピン
９０	糸保持板
９１	板バネ部材
１０４Ａ	糸止め部
１０６	糸案内具
１０６Ａ	糸案内部材
１０８	糸案内隙間
１０８ａ	導入口
１３３	糸調子皿
１３５	糸調子バネ
２００	操作体装着部
２０１	糸掛け用操作体
２０７	上糸操作部
２０８ａ	糸通し作動部

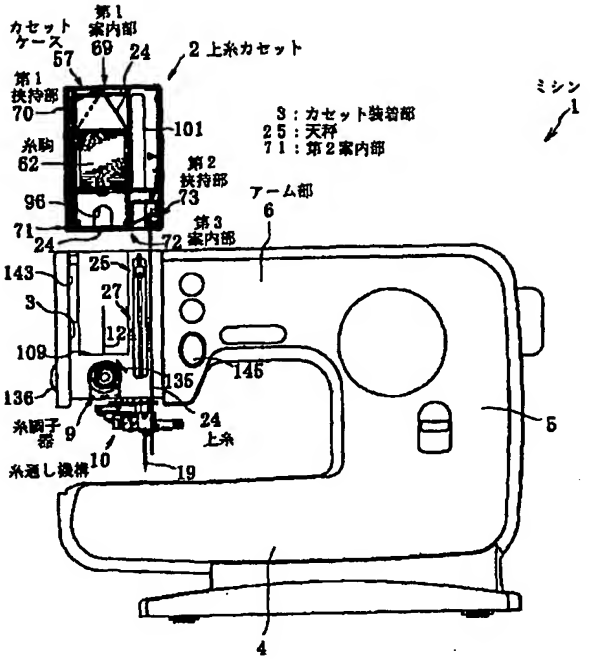
【図２】



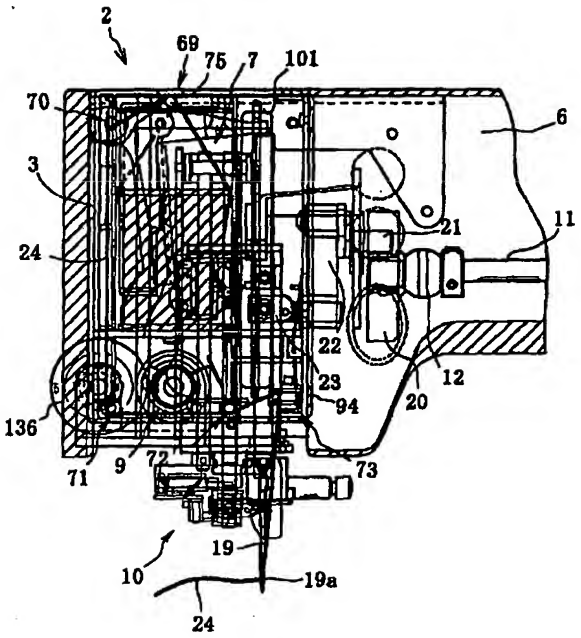
【図１１】



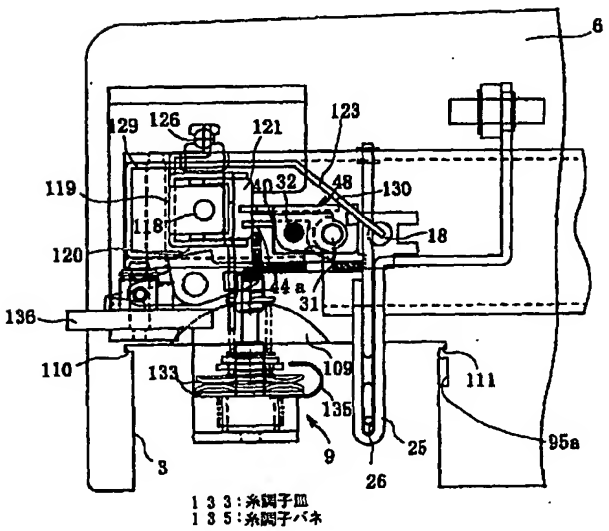
【図１】


カセットケース
第１案内部
第１挟持部
糸駒
第２挟持部
第３案内部
アーム部
ミシン
２上糸カセット
３：カセット装着部
２５：天秤
７１：第２案内部
糸調子器
糸通し機構
上糸

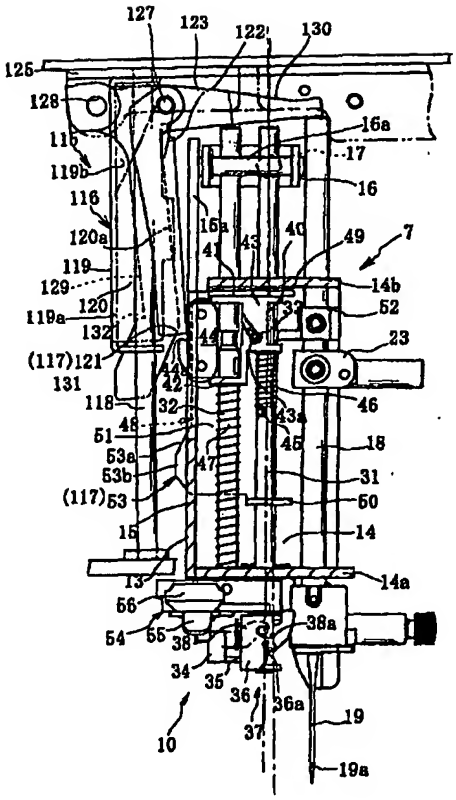
【図３】



【図４】


１３３：糸調子皿
１３５：糸調子バネ

【図５】



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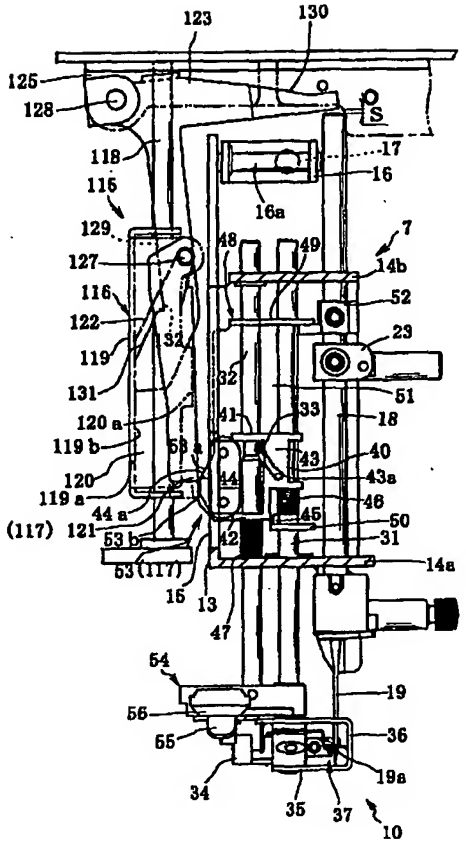
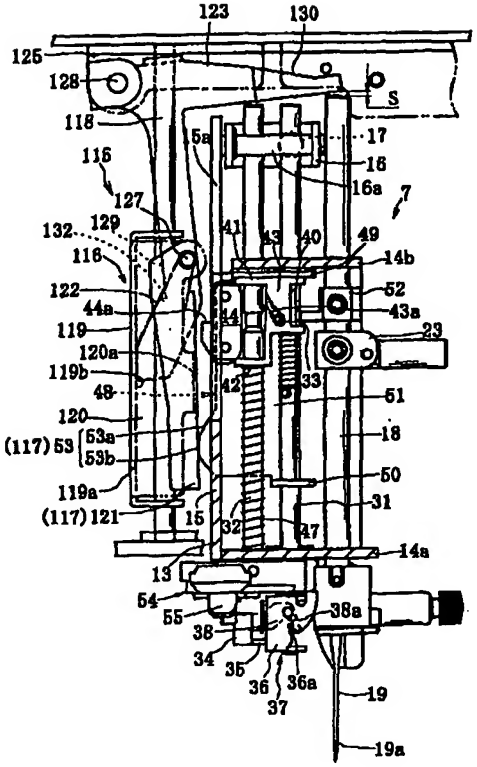
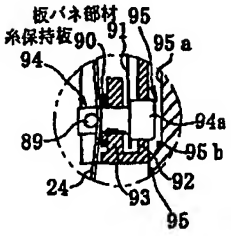


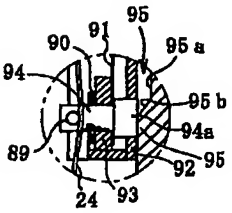
【図７】



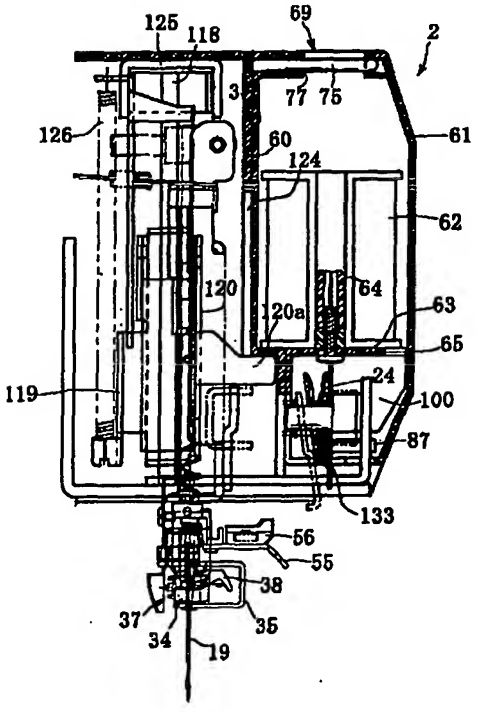
【図１８】



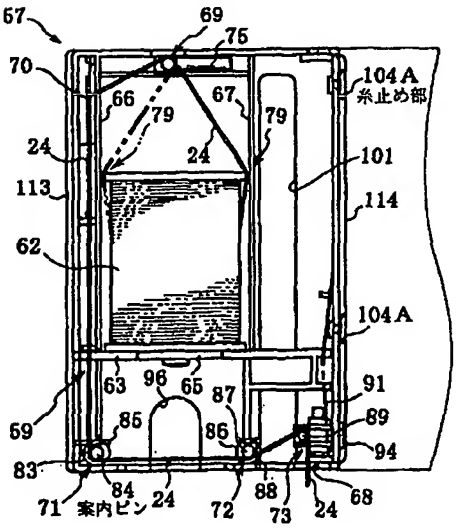
【図２０】



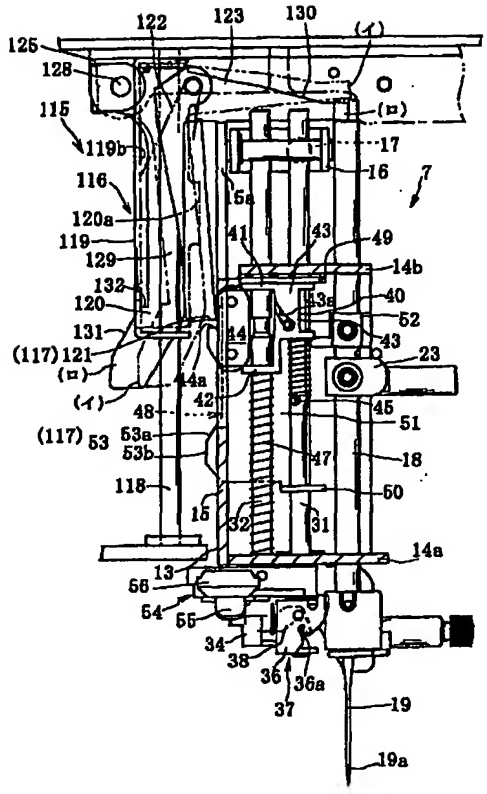
【図１０】



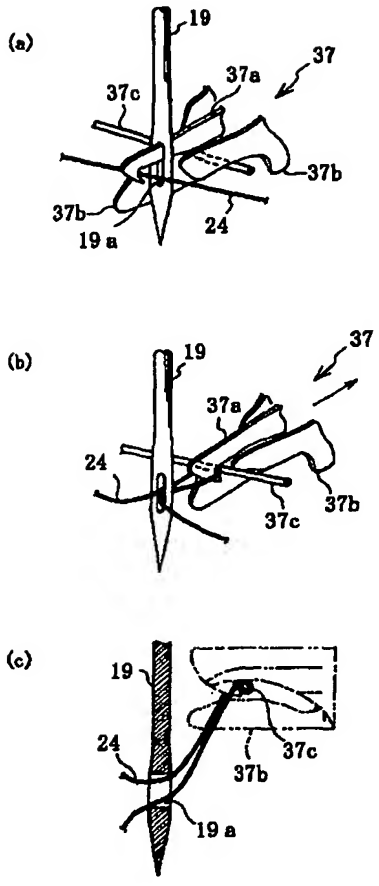
【図２３】



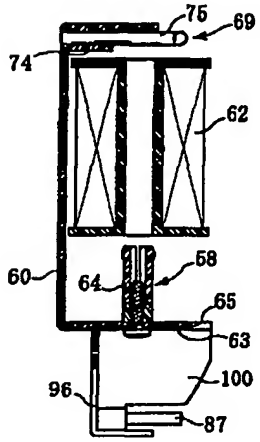
【図８】



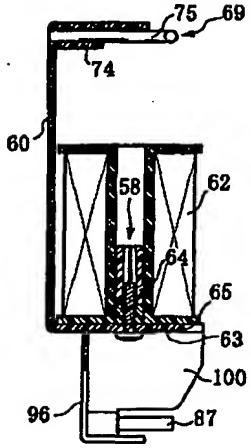
【図９】



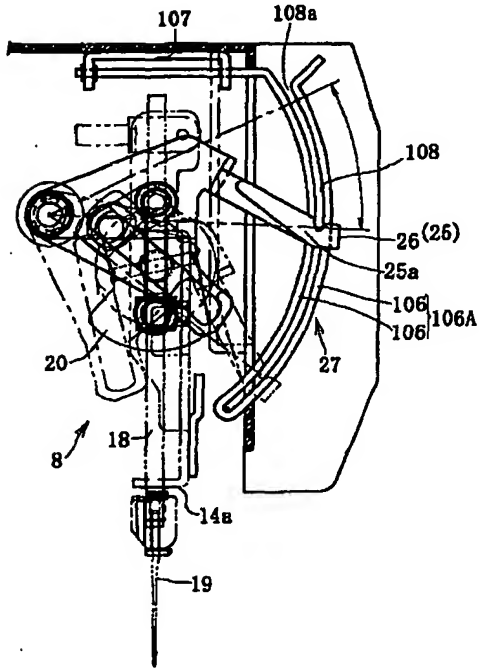
【図２８】



【図２９】



【図１３】



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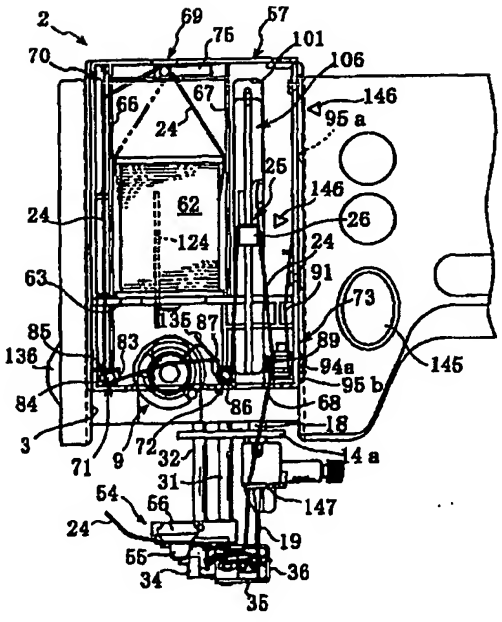

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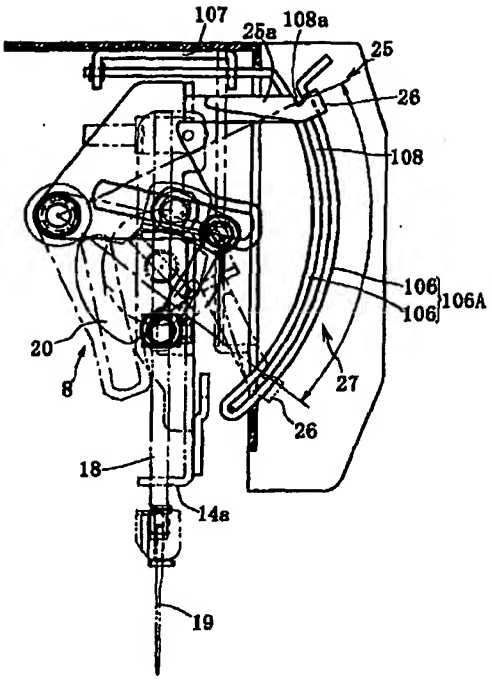

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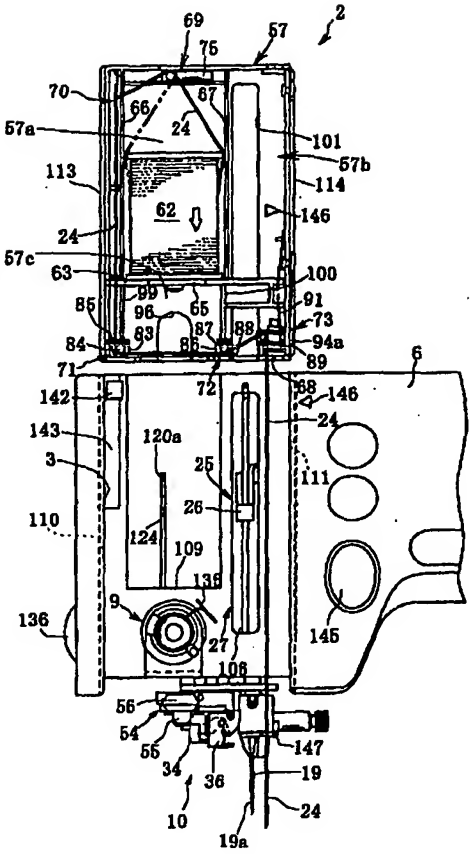

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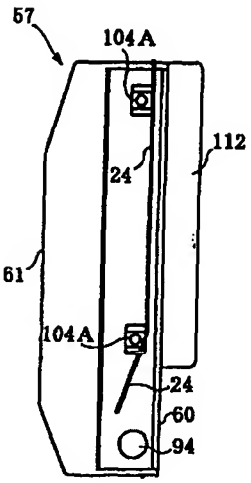

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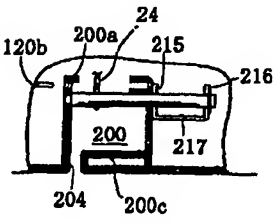

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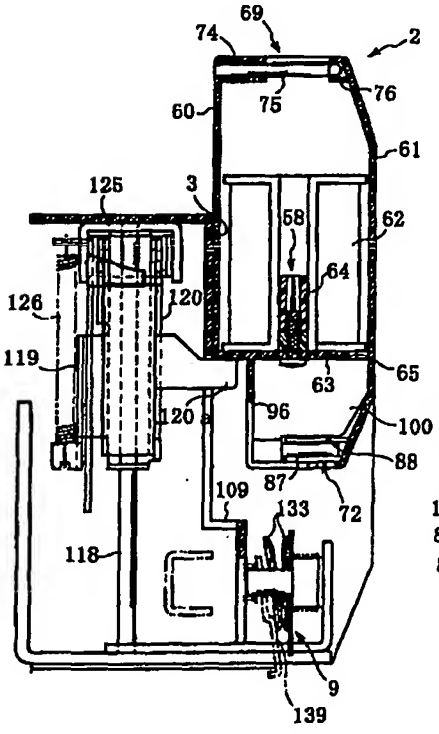

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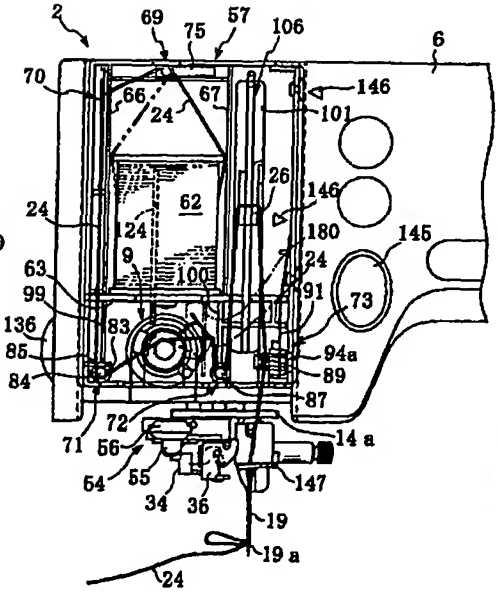

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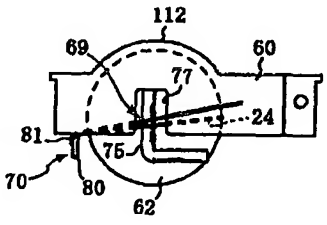

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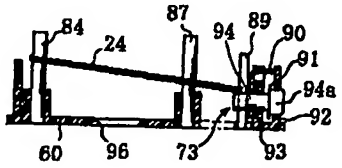

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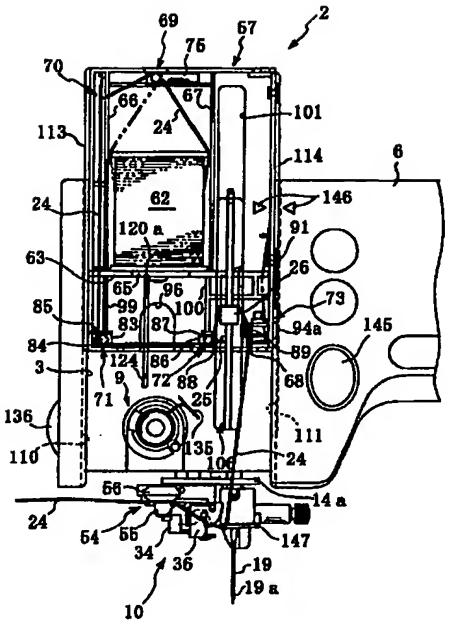

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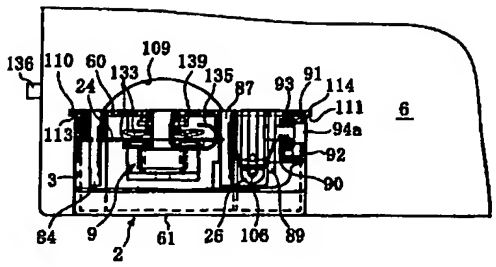

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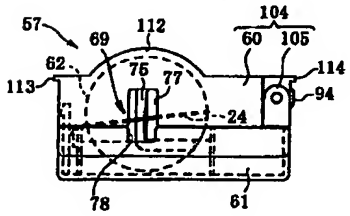

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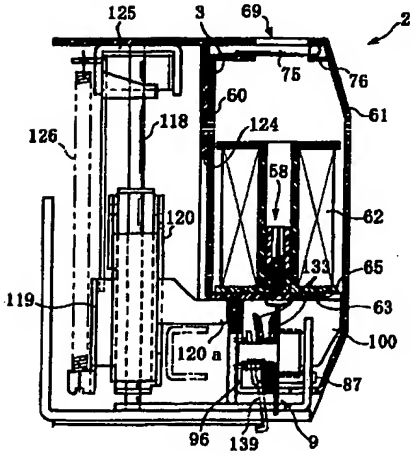

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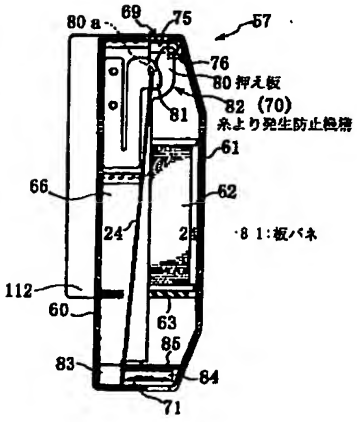

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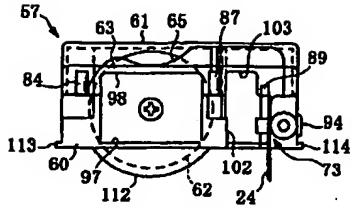

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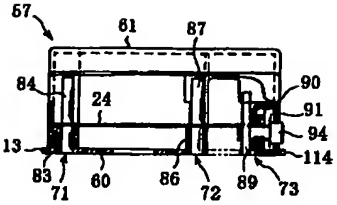

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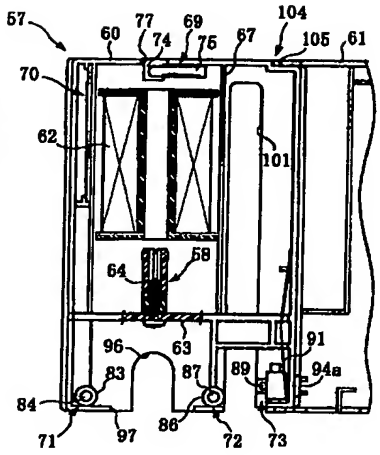

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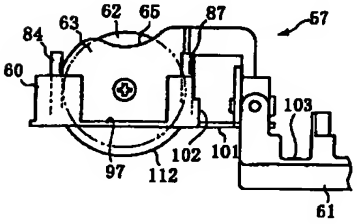

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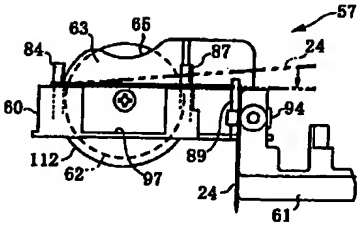

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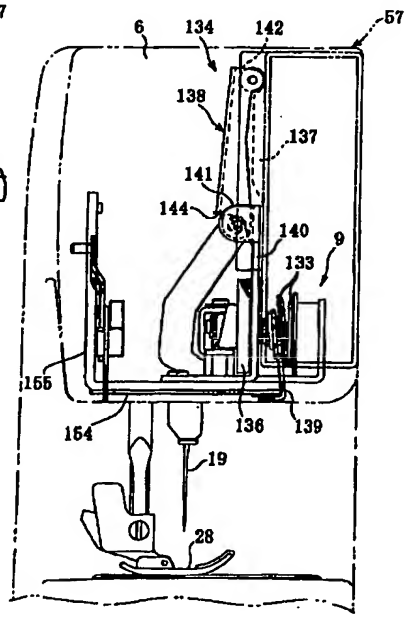

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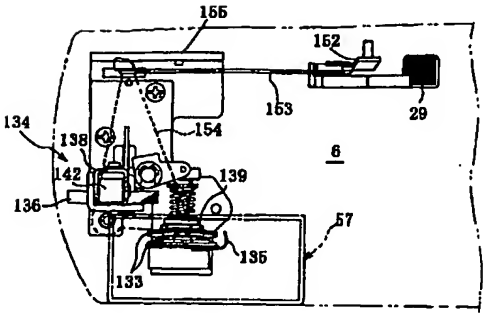

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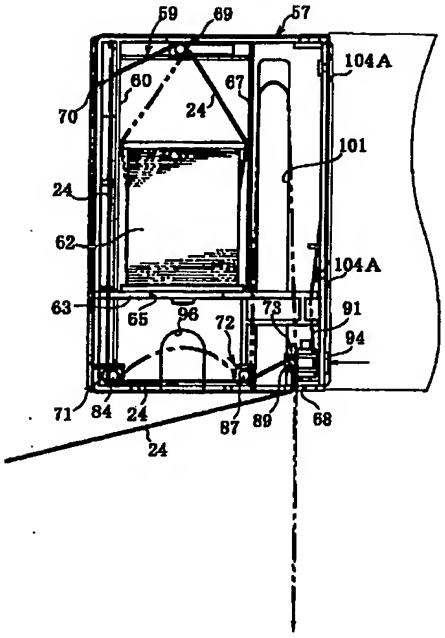

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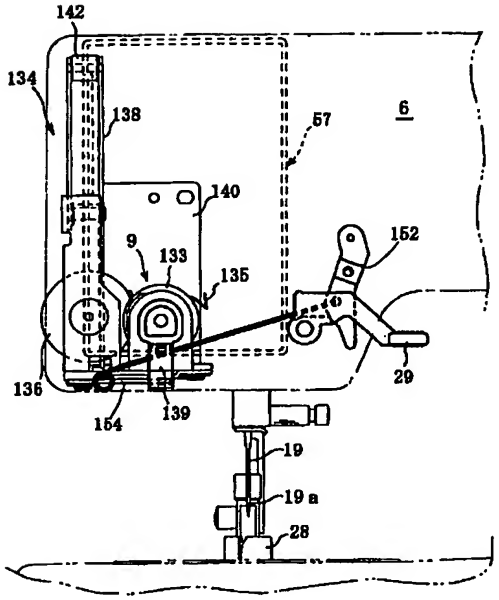

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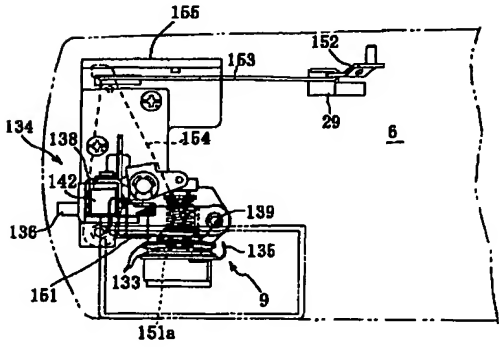

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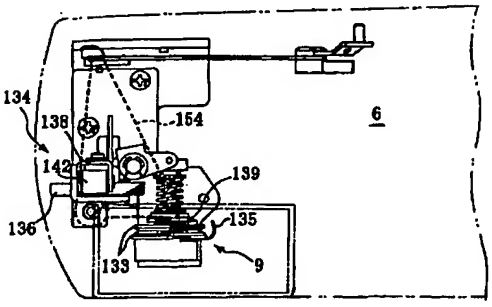

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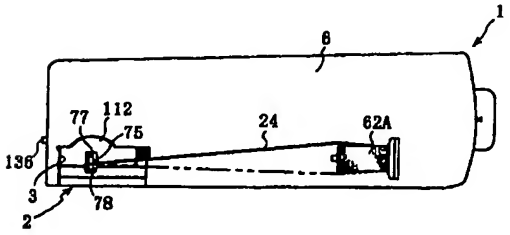

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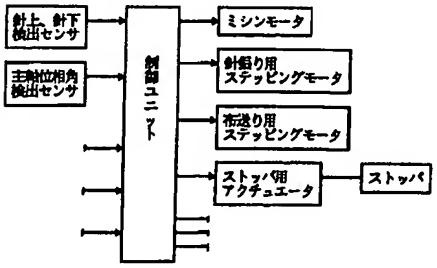

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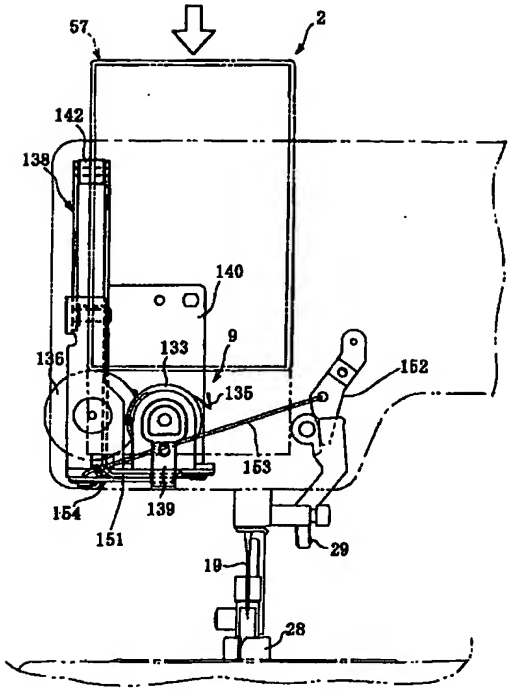

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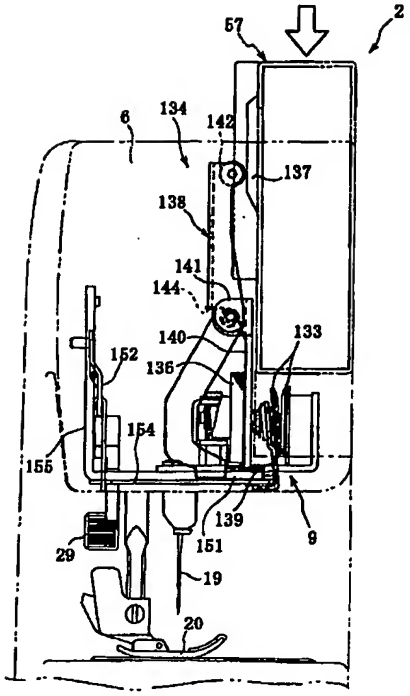

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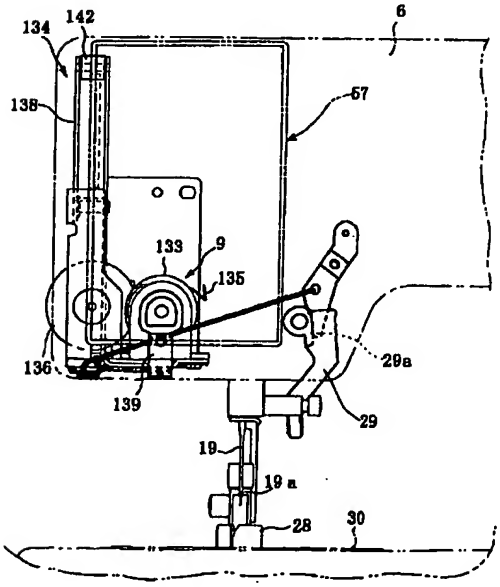

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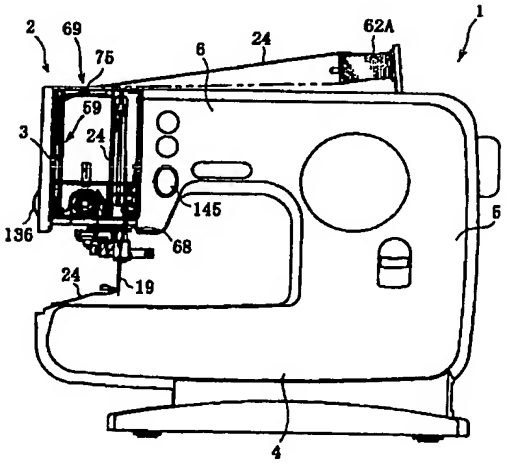

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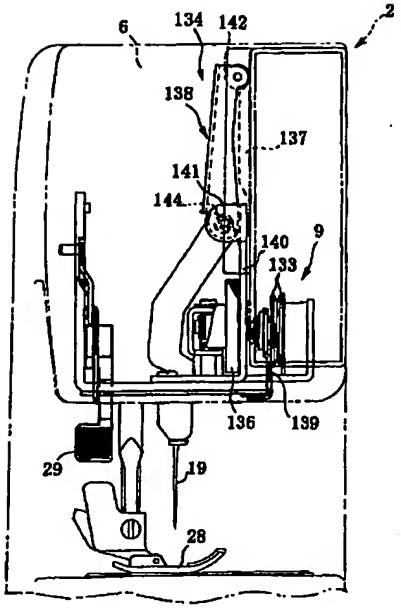

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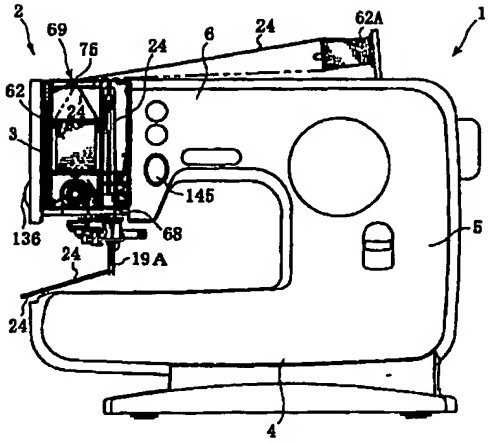

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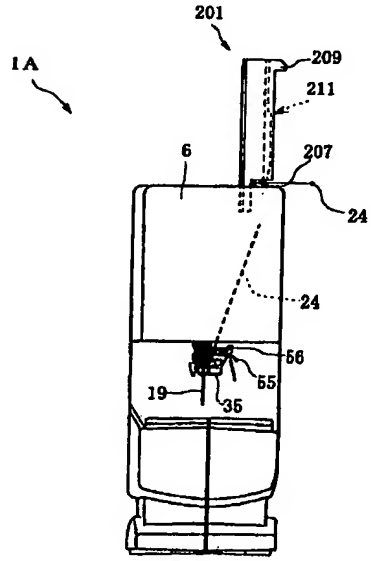

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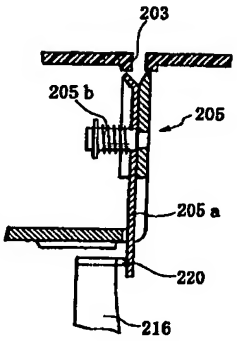

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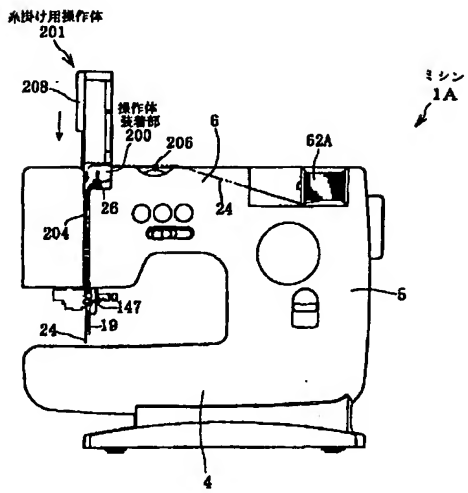

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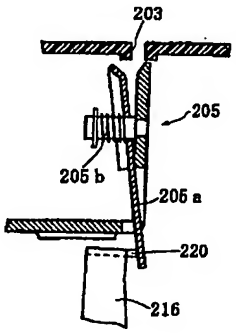

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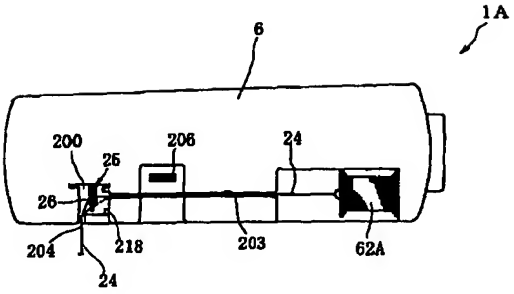

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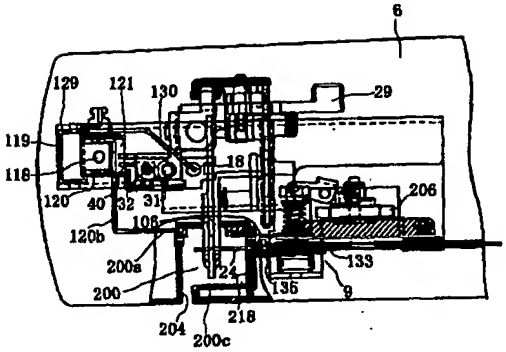

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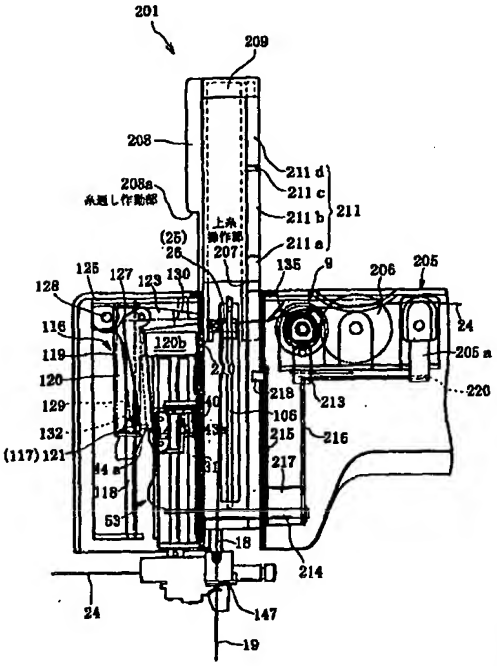

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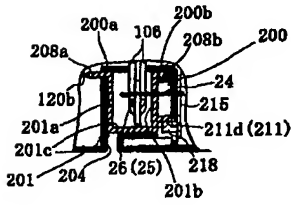

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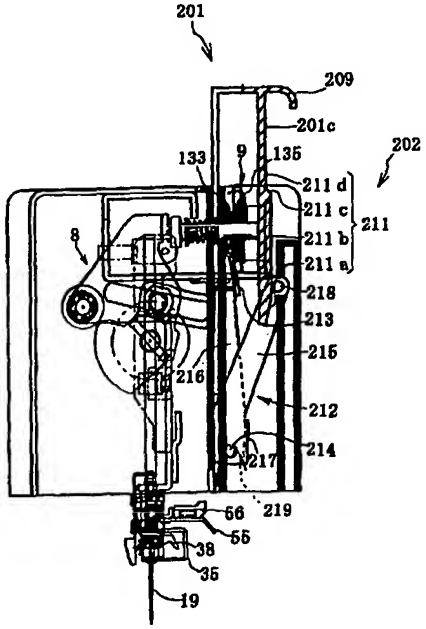

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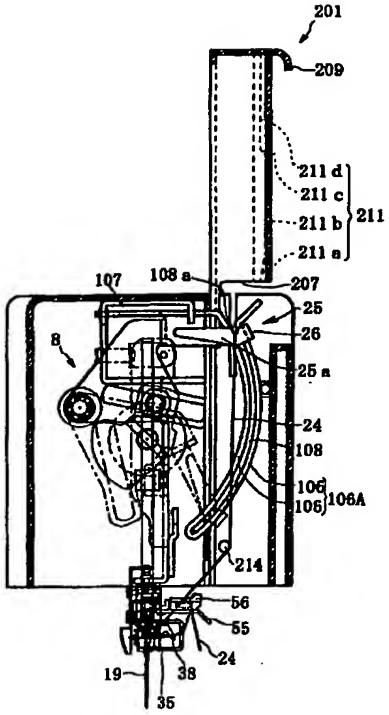

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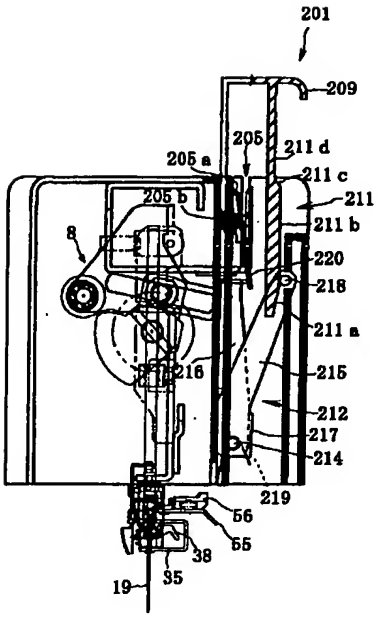

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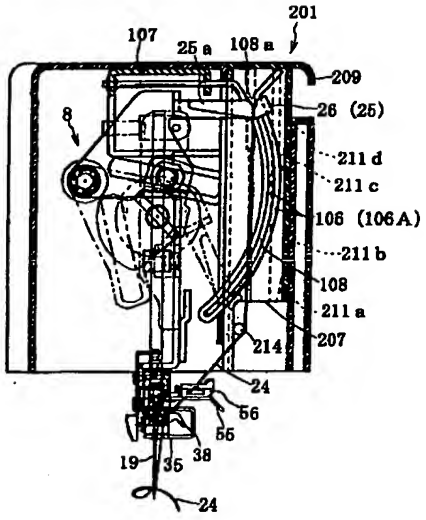

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